

## ***Lecture 1***

# Introduction to Mobile Business II

Application Design, Applications,  
Infrastructures, and Security

**Mobile Business II (SS 2016)**

**Prof. Dr. Kai Rannenberg**

Deutsche Telekom Chair of Mobile Business & Multilateral Security  
Goethe University Frankfurt a. M.



- The Chair of M-Business and Multilateral Security
- Teaching and Research Agenda
- Introduction into Mobile Business -  
History of Mobile Business & Mobile  
Telecommunication Systems
- Outline of this Course

## Business Informatics @ Goethe University Frankfurt

<b>E-Finance</b>  Prof. Dr. Peter Gomber	<b>Business Informatics (Informatics)</b>  Prof. Dr. Mirjam Minor	<b>Information Systems Engineering</b>  Prof. Dr. Roland Holten
<b>Business Education (associated)</b>  Prof. Dr. Gerhard Minnameier	<b>Business Informatics</b>	<b>Business Education (associated)</b>  Prof. Dr. Eveline Wuttke
<b>Information Systems &amp; Information Management</b>  Prof. Dr. Wolfgang König	<b>Business Informatics &amp; Microeconomics</b>  Prof. Dr. Lukas Wiewiorra	<b>Mobile Business &amp; Multilateral Security</b>  Prof. Dr. Kai Rannenberg

# Chair of Business Administration, especially Business Informatics, Mobile Business and Multilateral Security

Deutsche Telekom Chair of Mobile Business & Multilateral Security

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## Vita of Kai Rannenberg

Einbeck, Göttingen, Eystrup, Wolfsburg, ...  
TU Berlin (Dipl.-Inform.)  
Uni Freiburg (Dr. rer. pol.)

Dissertation on “**Kriterien und Zertifizierung mehrseitiger IT-Sicherheit**”  
Standardization at ISO/IEC JTC 1/SC 27 and DIN NI-27

Kolleg “**Sicherheit in der Kommunikationstechnik**”  
Gottlieb Daimler- and Karl Benz-Foundation

**Multilateral Security:**  
“Empowering Users, Enabling Applications“, 1993 - 1999

**Recent History**  
1999-09 till 2002-08  
Microsoft Research Cambridge UK  
[www.research.microsoft.com](http://www.research.microsoft.com)  
Responsible for “Personal Security Devices and Privacy Technologies”

2001-10 Call for this chair  
2001-12 till 2002-07 Stand-in for the chair

Since 2002-07 Professor







Kai Rannenberg



Jetzabel  
Serna-Olvera



Sebastian  
Pape



Shuzhe Yang



David Harborth



Fatbardh  
Veseli



Christopher  
Schmitz



Welderufael  
Tesfay

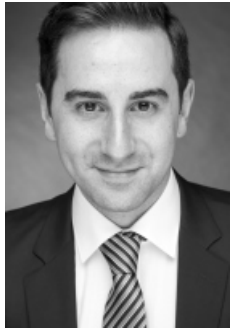


Ahmed Yesuf



Hernando  
Ospina

# Research Fellows & External PhD Students



Gökhan Bal



Mike  
Radmacher



Andreas  
Albers



Stefan  
Weiss



Christian  
Kahl



André  
Deuker



Markus  
Tschersich



Sascha  
Koschinat



Stephan Heim



Lars Wolos



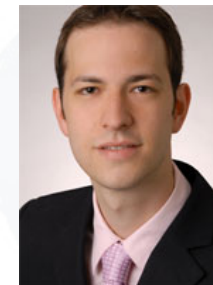
Tim  
Schiller



Niels  
Johannsen



Ahmad Sabouri



Marvin Hegen

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**Shuzhe Yang, M.Sc.**

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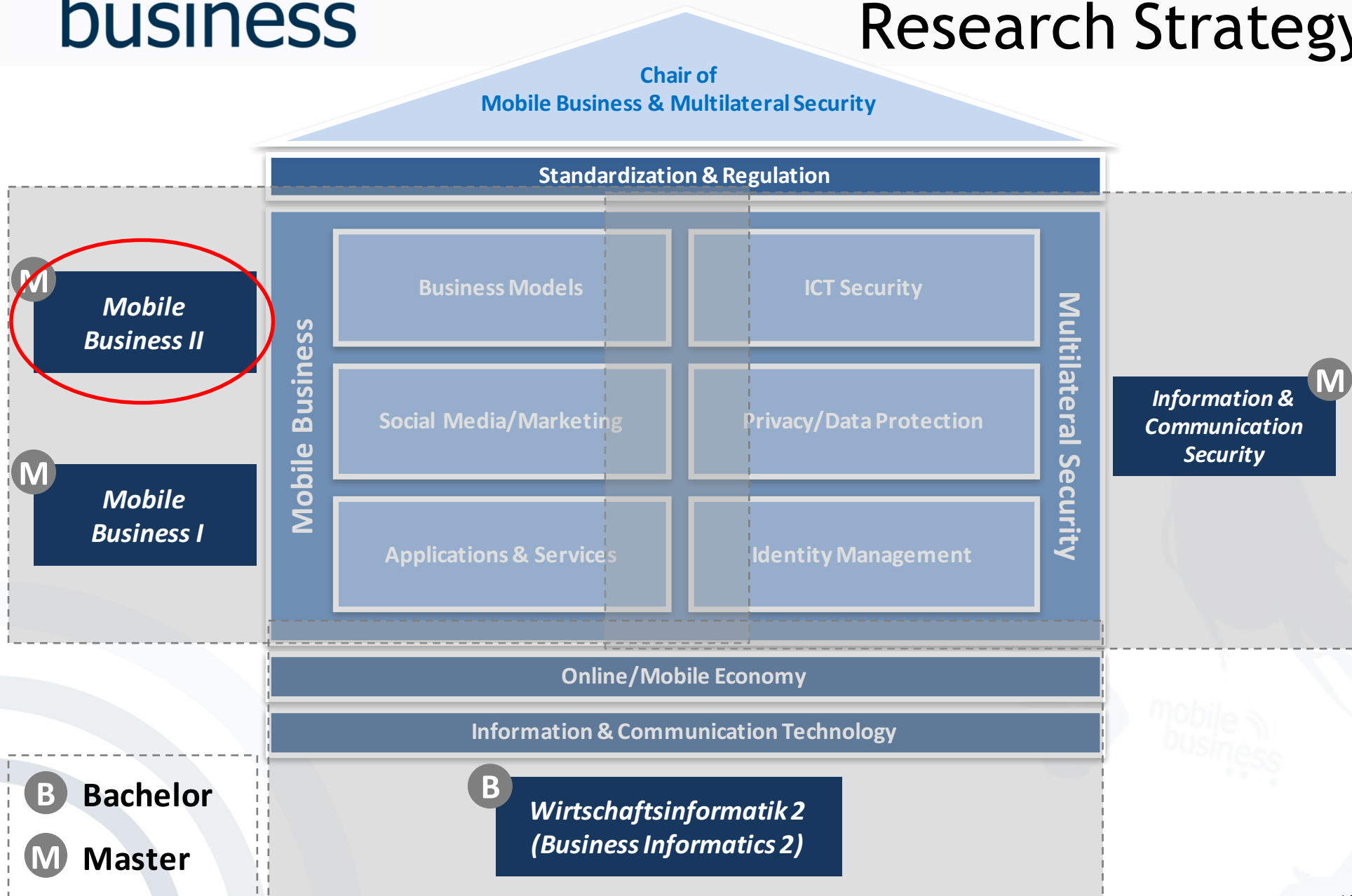


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	SS 2016	WS 2016/17
Bachelor	<p><i>Bachelor Seminar</i> Mobile Business and Multilateral Security</p>	
Master	<p><i>Course</i> Mobile Business II - Application Design, Applications, Infrastructures, and Security</p> <p><i>Course</i> Information and Communication Security: Infrastructures, Technologies, and Business Models</p> <p><i>Course</i> Privacy vs. Data: Business Models in the digital, mobile Economy</p> <p><i>Seminar</i> Privacy and uncertainty</p>	<p><i>Course</i> Mobile Business I: Technology, Markets, Platforms, and Business Models</p> <p><i>Course</i> Information and Communication Security: Infrastructures, Technologies, and Business Models</p> <p><i>Seminar</i> Project-Seminar, Topic tbd</p>



- Usage and trial of “Mobile Services & Devices”
- Experience “M-Business” life
- Experience security issues
- Compare with state of the discussion in research
- Feedback to designer and developers
- Influence future work environments

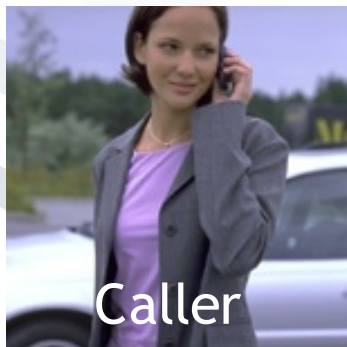




- **Multilateral Security**
  - Security, Trust and Privacy
  - Mobile Signatures
  - Personal Security Devices
- **Mobile Life, Work, and Business**
  - Location Based Services
  - Mobile Communities
- **M-Infrastructures**
  - Combination, Integration, Innovation
  - Standardisation, Regulation

## The features

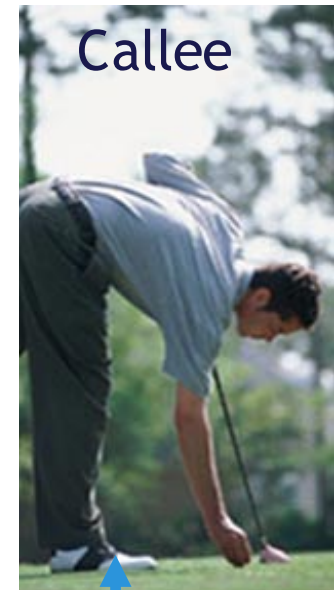
- User specified automatic call filtering
- Higher protection for caller and callee
- Range of possibilities to signalise urgency
- Range of reaction possibilities



Call



Call  
Negotiation



- Extent of identification
- Urgency of the call
- Security requirements
  - authentication
  - confidentiality
  - non-repudiation




## Topics of Negotiation

**RMS Call**

Who Rannenber, Katrin

◆ My ID: none

◆ Subject: Meeting? 

 .....

Urgency:

☒ Normal ☐ High ☐ Emergency

Security Settings: [View Details](#)

◆ Confidentiality: Important

◆ Authentication Don't care

[Cancel](#) [Call](#)

# Expressing Arguments for Your Call

Statement of urgency

“It is really urgent!”

Specification of a function

“I am your boss!”

Specification of a subject

“Let’s have a party tonight.”

Presentation of a voucher

“I welcome you calling back.”

Provision of a reference

“My friends are your friends!”

Offering a surety

“Satisfaction guaranteed  
or this money is yours!”

**RMS Question**

The subscriber wishes to be informed of your identity before the call could be connected.

Katrin Rannenberg's RMS requests for your identity:

◆ Id: ☒ none  
Damker [DS 97], Herbert  
Damker, Herbert  
Pseudonym Harry Hurtig (P)

**RMS Question**

At the moment the subscriber can only accept urgent calls. Please decide!

Katrin Rannenberg's RMS requires an answer to the request above:

☒ My call is urgent, please connect.  
☐ At the moment my call is not so urgent.

Cancel Answer



## RMS Accepted Call (Callee Display)

- Bell is ringing!
- Callee notified
- Callee can still decide to accept or deny the call.

RMS100

◆ Current Situation: Private

Accept Call?

Call with normal urgency  
For: Kai Rannenber  
From: Herbert Damker  
Subject: Paper accepted!

Stop Ringing

DenyAccept

i +Show

Send

Call

X

Names

Dates

Extras

Undo

Find

Assist





## RMS Denied Call (Caller Display)

- Call not connected
- Caller gets information (configured by callee)
- Caller can leave a message or request a call back.

**RMS: Call denied**

Unfortunately the subscriber can not accept the call at the moment.

**Leave with Katrin Rannenberg:**

☒ Text message  
☐ Request for callback (with voucher)  
☐ No message

**Cancel** **OK**



## Situations

Set of rules how to deal with an incoming call

## Rules

Combination of features

Users can reconfigure initial rules and situations as they like.

### Define Situation 'Meeting'

☐ Emergency  
-> connect

☐ Callback voucher  
-> connect

☐ Caller in group: Colleagues  
-> let caller decide  
Text: 'Request decision'

**Else**  
-> deny  
Text: 'Not available'

### Define Rule

In the situation 'Meeting'  
my RMS should for ...

☒ all calls
 ☐ calls of class:

☐ business calls
 ☐ private calls

... and ...

☐ no caller ID

☐ caller want to be anonymous

☒ callback voucher

☐ caller in group:

☐ caller is:

☐ every caller

☐ Emergency

... do the following:

☒ connect

☐ deny

☐ divert to:

☐ require surety of \$10 and connect

☐ require subject and connect

☐ let caller decide

☐ require caller ID

Text to send: -



- **Fictitious**, but **realistic** cases
- **Real users:**  
ca 40 doctors, nurses,  
admin people, etc.
- 1 week **“Playtime”**
- 18 months **preparation  
and analysis:**  
workflow analysis  
usability tests, script  
writing, attack planning



- Reachability manager
- Negotiating security
- Identities and pseudonyms
- Signing device
- Medical information (patient records and knowledge base)
- Hospital communication

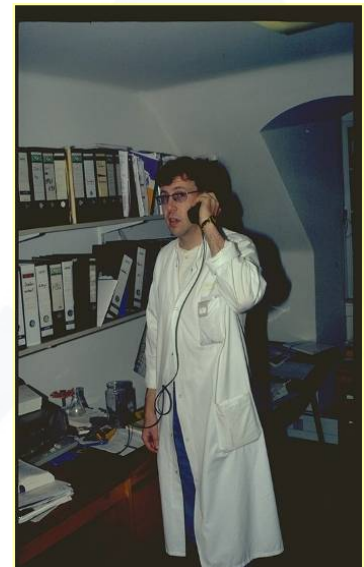
## Overall results

- High benefit for everyday tasks
- Increasing awareness of security
- Integration of asynchronous messages very useful
- Manual filtering of calls often used

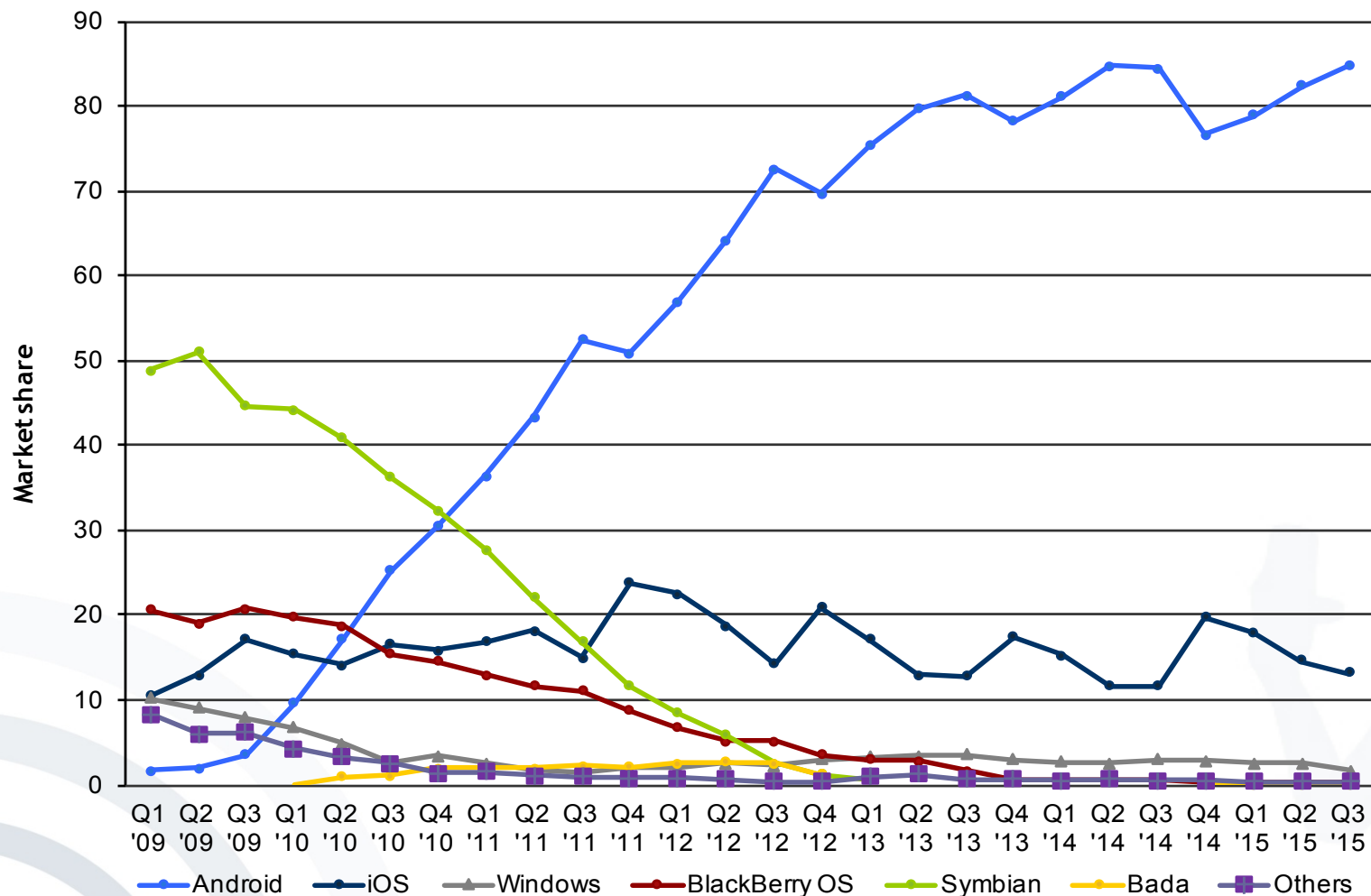
## User demands

- Smaller device - RMS functionality in mobile phone
- Integration of full-flavour email
- Authentication also during a call

## Many more *design* hints



# Worldwide Smartphone Sales to End Users by Operating System (2009-2014)





# Mobile Applications are getting more and more popular

- Over 1.500.000 Applications in Apple's App-Store in July 2015 (over 725.000 native iPad Apps)
- Centralised marketplace for software
- Several (dis)advantages compared with websites like
  - Access to hardware resources (like GPS)
  - Offline functionalities
  - Has to be developed for each OS individually
  - Mobile Native Apps vs. Mobile Web Apps
- HTML5 may integrate the advantages of Apps and mobile websites



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# What is Mobile Business ?

- There are as many definitions as interested parties.
- “Ask again in 5 years at best, then we will have further information ...”
- A multitude of related notions:  
E/C/V-Business, Mobile Commerce, Mobile...
- Hypes and myths
  - “Mobile Business is THE future!”
  - “Mobile Business is just a hype!”

# What is Mobile Business ?

We chose a definition that (hopefully) lets us do interesting things:

*“The usage of  
mobile devices, infrastructure,  
communication and interaction  
for  
mobile applications and  
transactions.”*

- Workplaces and private life will change thoroughly through mobile technologies and services.
- This implies extraordinary challenges and chances.
- The development will be strongly affected by international factors.





## GSM World

**Equipment Manufacturers**  
(Apple, Samsung, Microsoft, Nokia,  
Lenovo/Motorola, Huawei, ...)

**Telcos**  
(Telekom, Vodafone, Telefónica...)



IBM,  
Infineon, ...

MS, ...

Dell, ...

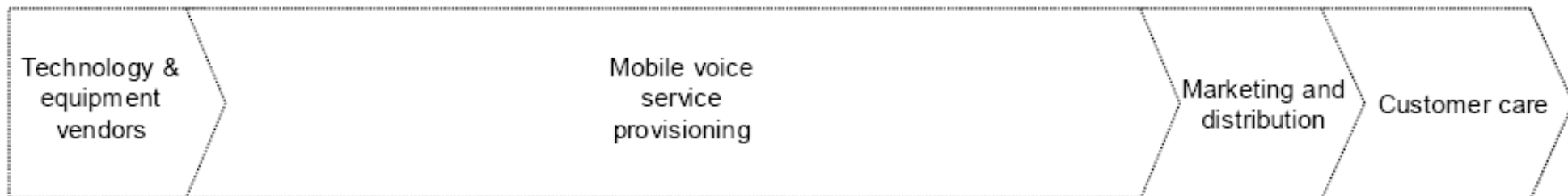
Cisco,...

Telekom  
Vodafone  
...

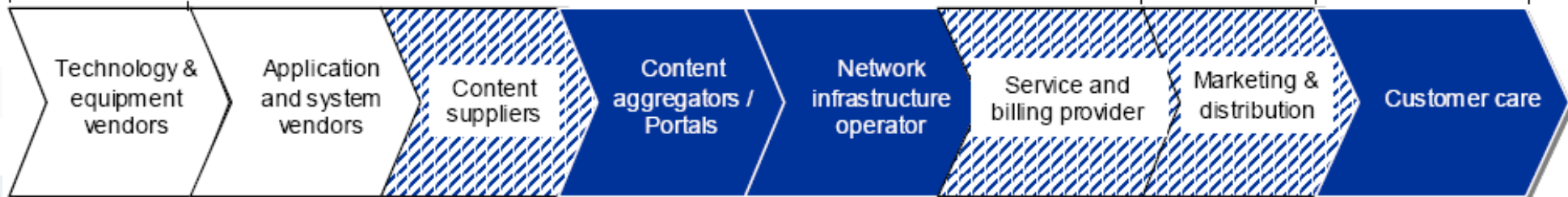
MS,  
IBM,  
...

MS,  
SAP,  
Telekom,  
Google  
...

## TRADITIONAL VALUE CHAIN OF MOBILE SERVICE DELIVERY



## EMERGING MOBILE OPERATOR VALUE CHAIN



Primary opportunity for operator



Some opportunity



Opportunity through alliances

## What makes Mobile Business mobile?

- Customers?
  - Terminals?
  - Service provisioning?
  - Means of payment?
  - Possibilities of interaction?
  - Business cases for Mobile Operators (and others)?
- ➔ One instrument for analysing are scenarios & visions.

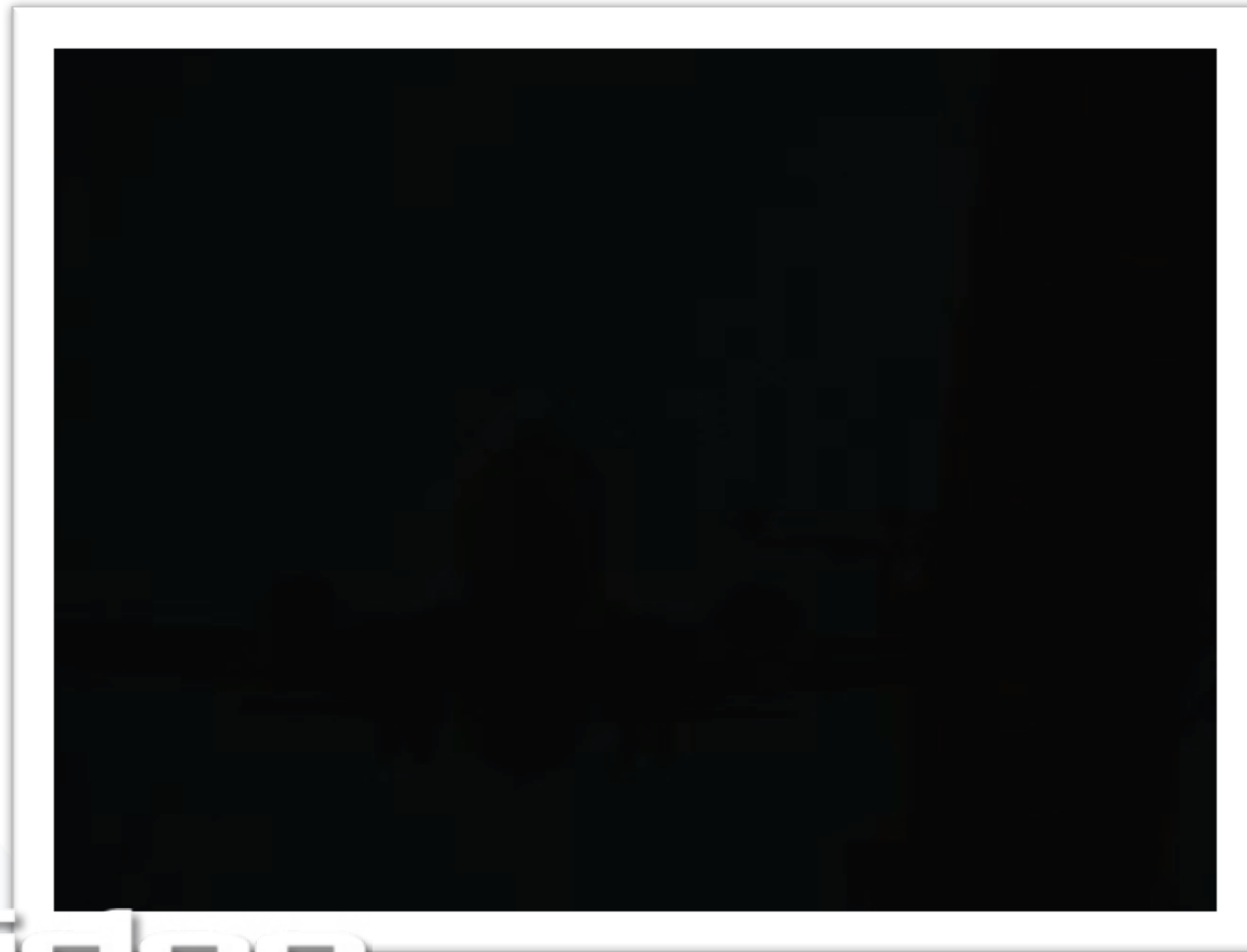
- Not every country's scenario (e.g. health care) can simply be transferred to another country.
- Mobile Business does not only relate to mobile phones. Other platforms are important, too.



- Classification of videos
  - Videos are useful because they convey visions.
  - Visions have to be benchmarked by reality.
  - Which aspects of visions are reasonable / useful?
  - What is necessary for their realization?
  - Can a business model emerge from this?
  - For whom?



# Illustrative Microsoft Video



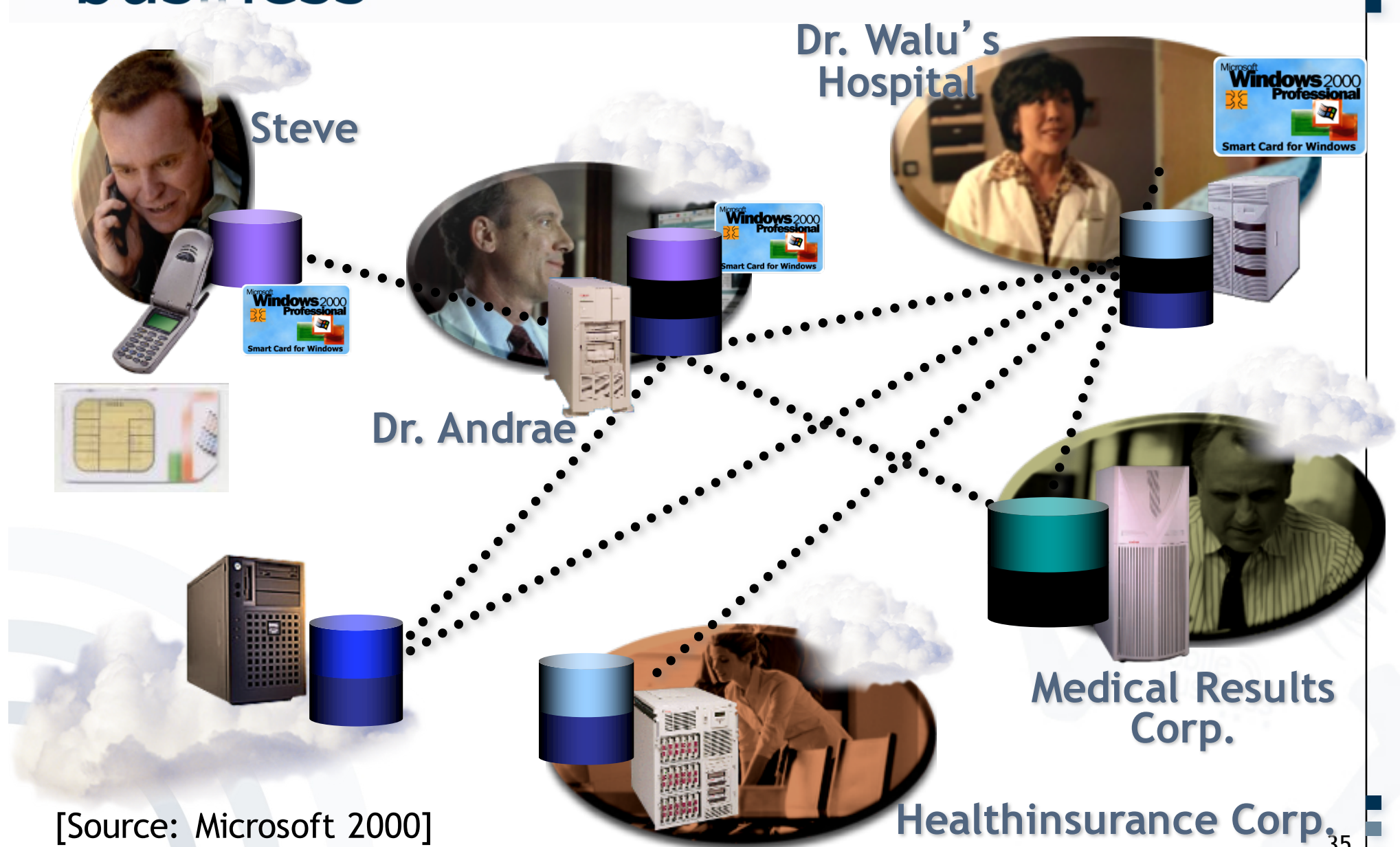
video

[Source: Microsoft]



# mobile business

## Parties Involved

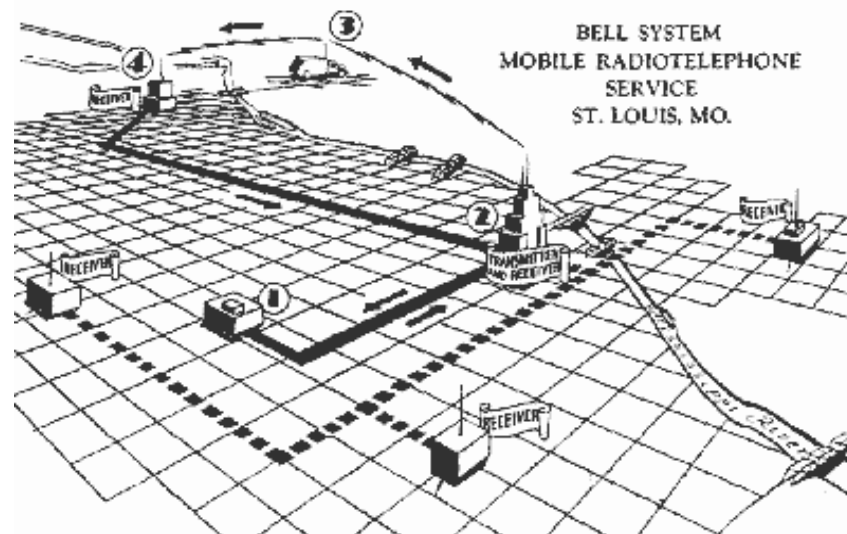


[Source: Microsoft 2000]

## History of Mobile Business Early Approaches



- February 14, 1876. Alexander Graham Bell, a Scotch deaf-mute teacher, patents his telephone (no. 174.465).
- June 17, 1946. AT&T and Southwestern Bell introduce MTS (mobile radio telephone service) in St. Louis, Missouri.



# History of Mobile Business

## Early German Mobile Networks

- 1958 A-Net (till 1977)
- 1972 B-Net (till 1994)
- 1986 C-Net (till 2000)



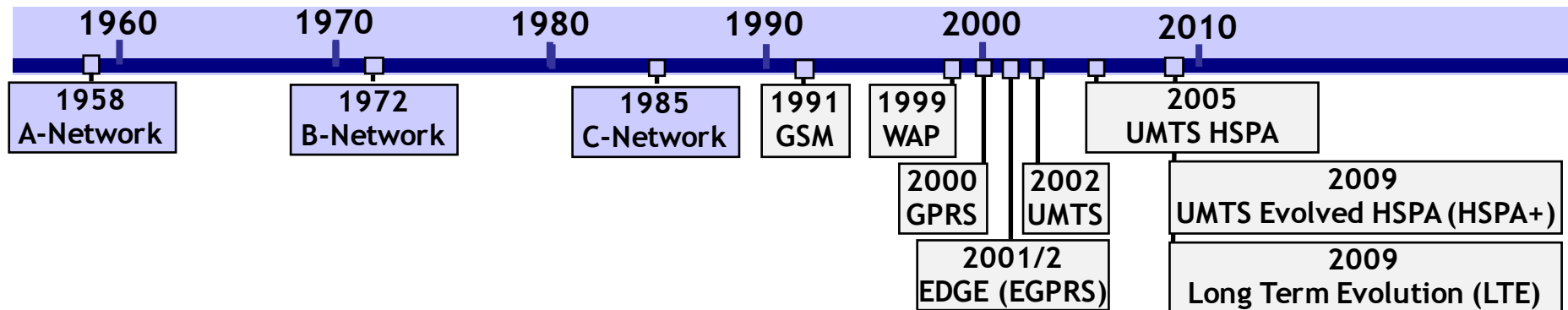


- Since 1981 NMT-450 (Nordic Mobile Telephone) in Norway, Sweden, Saudi Arabia, Denmark, Finland, ...



- First GSM trials 1991
- Commercial usage since 1992
- First digital mobile radio network with high voice quality and reliability (roaming).
- Global diffusion in more than 212 countries with more than 1 billion users.
- In February 2004 the first commercial mobile radio network (based on GSM) was launched in Iraq.
- GSM is the basis of data services like GPRS and EGDE.





## A-Network

First analog mobile radio system in Germany: Switching was done manually. Discontinued 1977



## B-Network

Further development of the A-Network: The caller who wanted to reach a mobile station had to know the other's location. Discontinued 1994-12-31

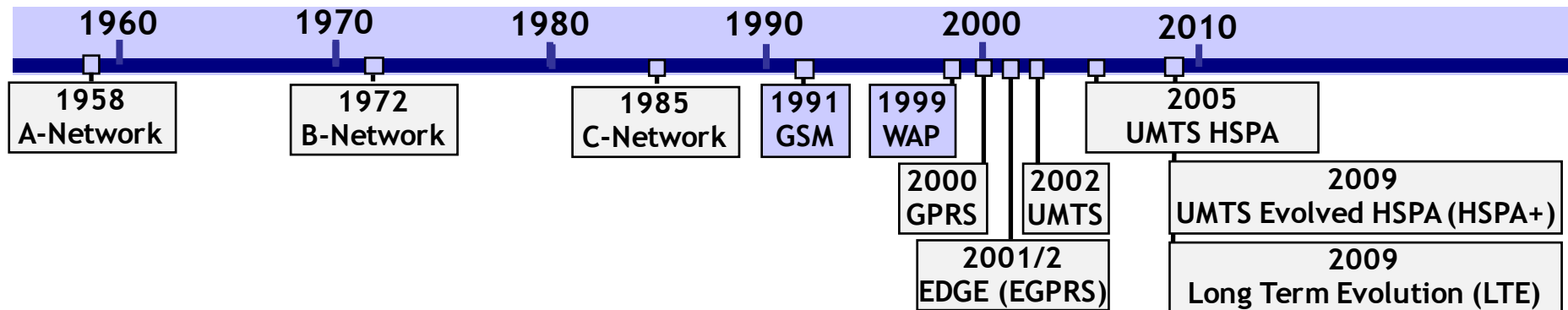


## C-Network

Analog, cellular mobile radio network of Deutsche Telekom. Discontinued 2000-12-31



## Development of the Mobile Radio Network



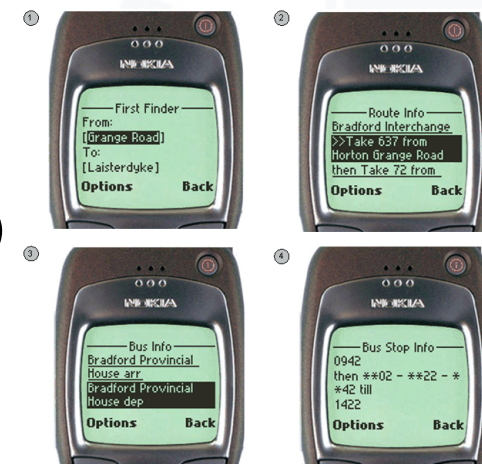
### GSM

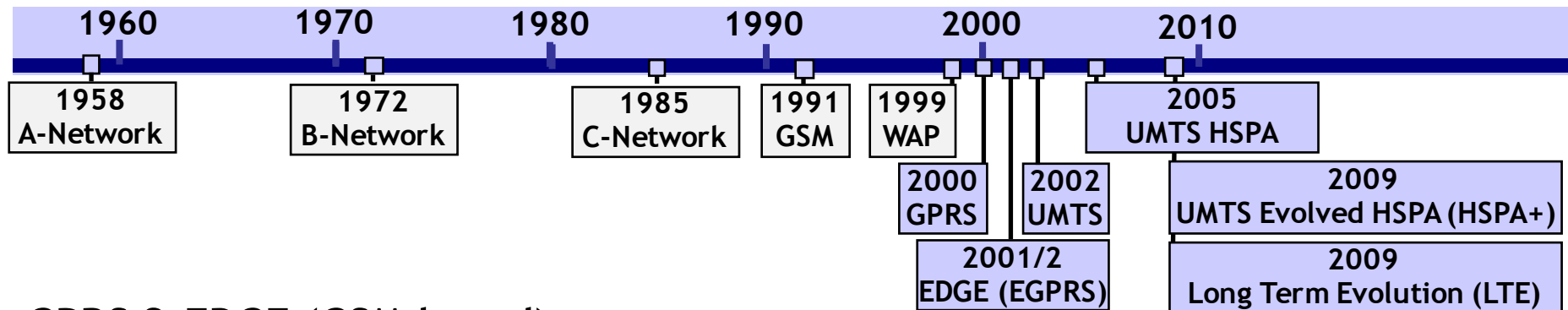
The technical standard for digital mobile radio networks in more than 100 countries; GSM includes data transfer services.

### WAP

The WAP standard describes a protocol suite. With special mobile phones certain mobile contents (pages) are accessible using WAP-enabled mobile phones.

[Source: WAP 2010]





## GPRS & EDGE (GSM-based)

Further development of the GSM standard: Data is transferred in packets. EDGE is an enhancement to GPRS and provides increased data transmission rates (3 to 4 times faster than GPRS).

## UMTS (3G) network

Third mobile radio standard and the successor of GSM for mobile multimedia incl. video and audio transmissions.

## UMTS High Speed Packet Access (HSPA), UMTS Evolved HSPA (HSPA+)

HSPA and Evolved HSPA (HSPA+) provide enhanced performance in speed and latency.

## Long Term Evolution (3.9G LTE)

LTE is the first all-IP mobile network technology. It provides significantly higher data rates, capacity and lower latency than HSPA and HSPA+.

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- Interest ...
  - ... in new topics
  - ... in the interaction of technology, business, economy and society
  - ... in experiments
- Other Business Informatics lectures help but are not mandatory.



## *Lectures and Exercises*

12.04.2016	L01	Introduction	Lecture
19.04.2016	L02	Cryptography	Lecture
20.04.2016	G01	Guest Lecture by Michael Pachmajer (PWC): IoT Business Models	Guest Lecture
26.04.2016	L03	Positioning Methods for Location-based Services	Lecture
03.05.2016	L04	LBS Business Models	Lecture
04.05.2016	L05	M-Payment I	Lecture
10.05.2016	L06	M-Payment II	Lecture
17.05.2016	L07	Data Protection / IdM	Lecture
18.05.2016	E01	Cryptography	Exercise
24.05.2016	L08	Regulation of (Mobile) Telecommunications	Lecture
31.05.2016	E02	LBS and Mobile Communities	Exercise
01.06.2016	G02	Guest Lecture by Steffen Moritz (Deutsche Telekom): Digital Touchpoint Mgt.	Guest Lecture
07.06.2016	L09	Regulation by Licensing	Lecture
14.06.2016	G03	Guest Lecture by Sebastian Pape: Cloud Computing	Guest Lecture
14.06.2016	E03	Cloud Computing	Exercise
15.06.2016	G04	Guest Lecture by Gökhan Bal (Deutsche Bahn): Mobile Security	Guest Lecture
21.06.2016	E04	Regulation	Exercise
28.06.2016	L10	Electronic Signatures	Lecture
05.07.2016	L11	HCI Issues	Lecture
12.07.2016	L12	Design Evaluation	Lecture
13.07.2016	L13	Current Research and Q&A	Lecture and Q&A

## Please Note:

Electronic library of Journals, access to more than 2000 Journals

<http://www.ub.uni-frankfurt.de/online/emedien.html>

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[search.epnet.com/login.asp](http://search.epnet.com/login.asp)  
[www.jstor.org](http://www.jstor.org)



## Online search engines:

[scholar.google.com](http://scholar.google.com)  
[academic.live.com](http://academic.live.com)





Microsoft (2000) Materials for the Introduction of .Net

Passerini, K.; Gagnon, S. Cakici, K. (2004) Opportunities in the Digital Economy: A New Value Chain and Services for Mobile Telecom Operators, in: C. Bullen and E. Stohr (Eds.) *Proceedings of the 10th American Conference on Information Systems*, New York, NY, USA, pp.2530-2535.

Statista2014a

<http://de.statista.com/statistik/daten/studie/73662/umfrage/marktanteil-der-smartphone-betriebssysteme-nach-quartalen/>