
Mobile Communications Introduction

Content

- Introduction
- Fundamentals
- Multiple Access
- Wireless Telecommunication
- Satellite
- WLAN
- Network Layer
- Adhoc Networks
- Transport Layer
- Security

Literature

- Raj Kamal, Mobile Computing, Oxford University Press, USA, 2008
- Mazliza Othman Principles of Mobile Computing and Communications, Auerbach Publications, 2007
- Jochen H. Schiller , Mobile Communications (2nd Edition), Addison Wesley, 2003
- Andreas F. Molisch, Wireless Communications, Wiley, 2011

The field of mobile communications is so dynamic that the recommended book may not include some up to date technology. In the lecture we try to give up to date references whenever necessary.

What is Mobile Communication?

mobile is not identical to wireless

examples:

- hasn't got anything to do with mobility:
 - connect a personal computer at home to a wireless 802.11n base station to avoid installing cables in the house
- has a lot to do with mobility:
 - connect your notebook through a cable in a hotel to the internet
 - check your email in an internet cafe by webmail

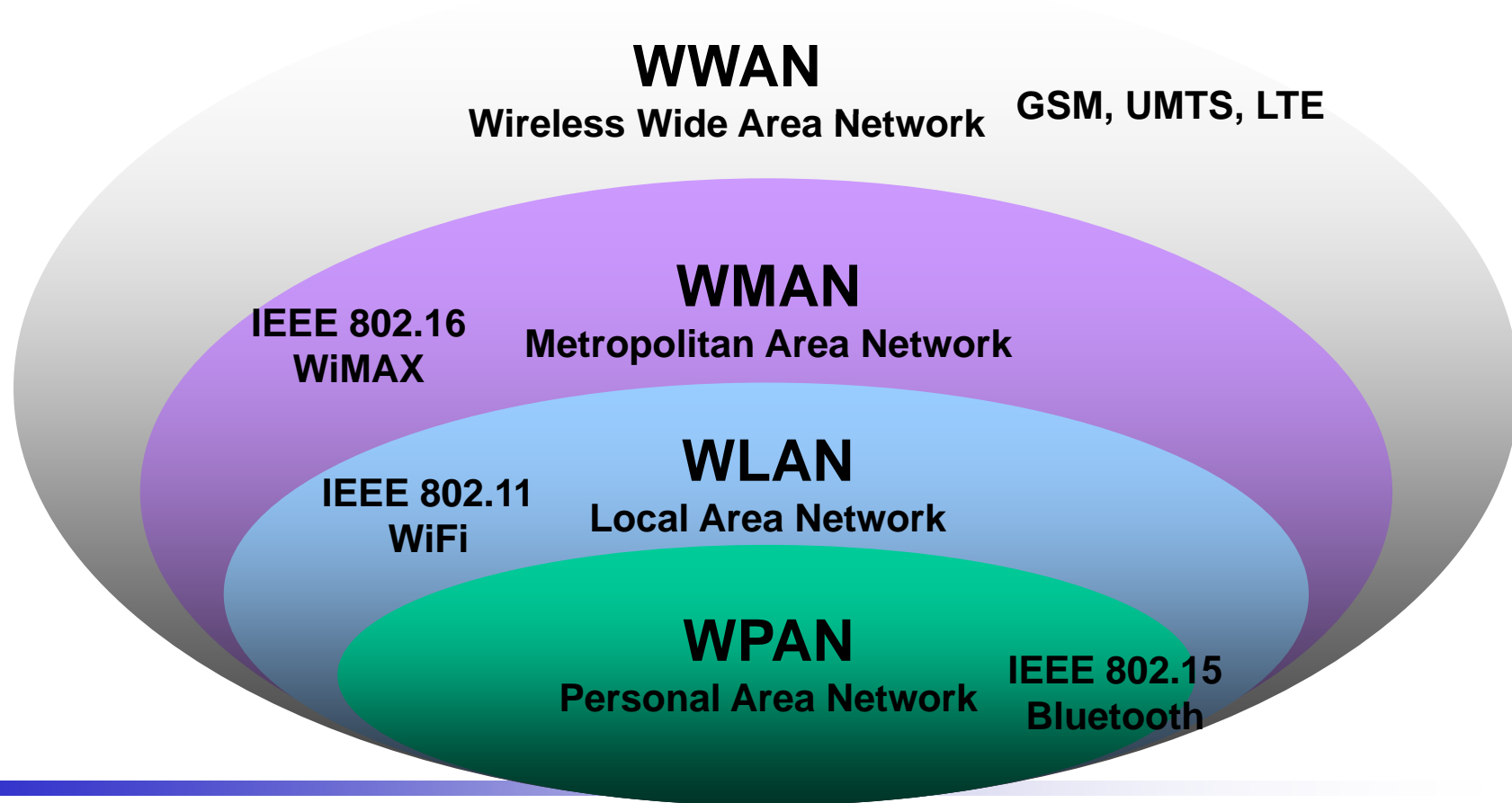
What is Mobile Communication?

ways of mobile network access:

- nomadic
 - the device is connected for a limited time to a bases station. During this time the user doesn't move outside the reach of the base station. After that time the user disconnects and moves to another base station (“hot spot”)
- portable
 - the device holds a connection with the network while the user moves at walking speed. Simple handover functionality, not necessarily seamless
- basic mobile
 - the device holds a connection for non-real-time applications at vehicle speed, handover and service continuity
- fully mobile
 - network connection at vehicle speed for any service, in particular real-time, e.g. voice.

What is Mobile Communication?

types of mobile networks



What is Mobile Communication?

mobile communication

= location independent (personal) communication

more or less possible mobility depends on

- network coverage
- range of wireless access
- availability and reachability of access points

rule of thumb:

- the more mobile, the more expensive
(measured in \$ per bit, \$ per bit/s, \$ per sec)

What is Mobile Communication?

examples of wireless access technology which can be seen under the aspect of mobility:

- terrestrial cellular networks, e.g. GSM, UMTS, CDMA2000, ...
- wireless LAN 802.11a,b,g,n
- WiMAX 802.16
- Bluetooth
- satellite communication, e.g. Iridium, Thuraya
- trunked radio, e.g. TETRA

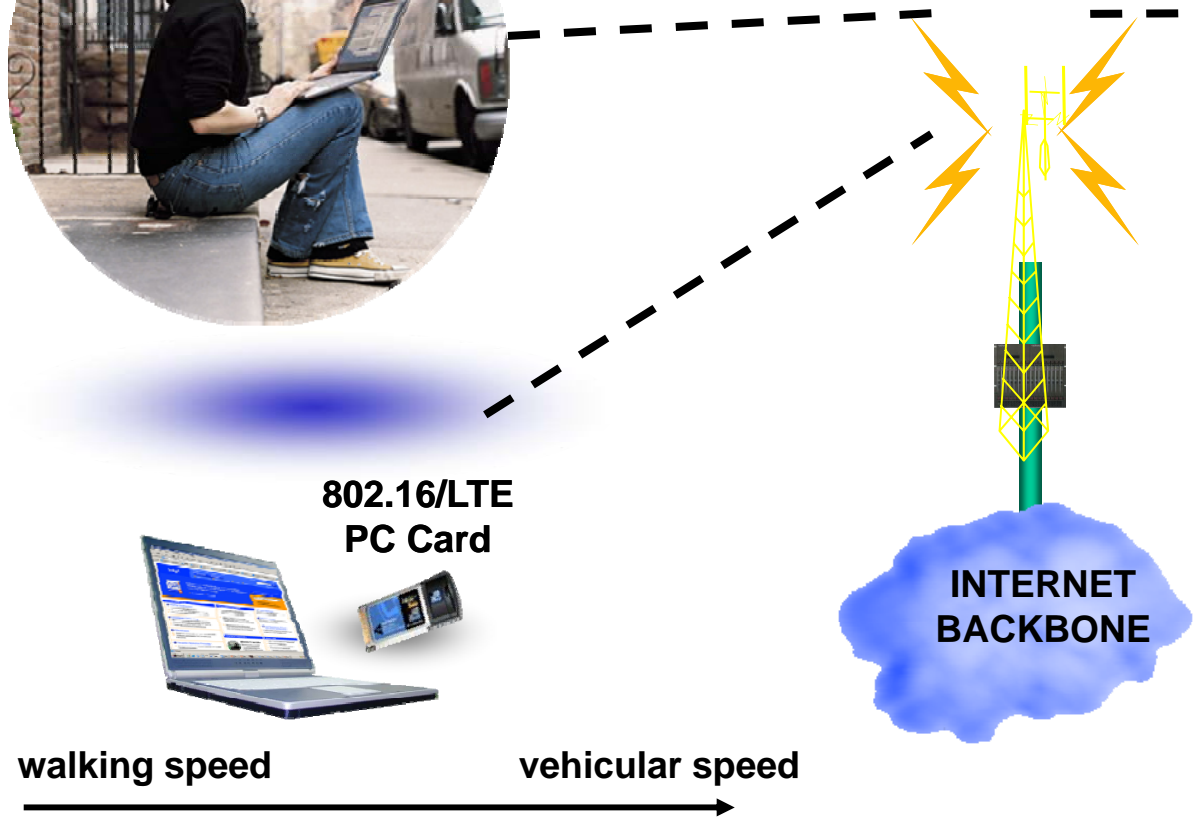
Application examples

no comment



Application examples

mobile data connectivity



802.16/LTE
PC Card



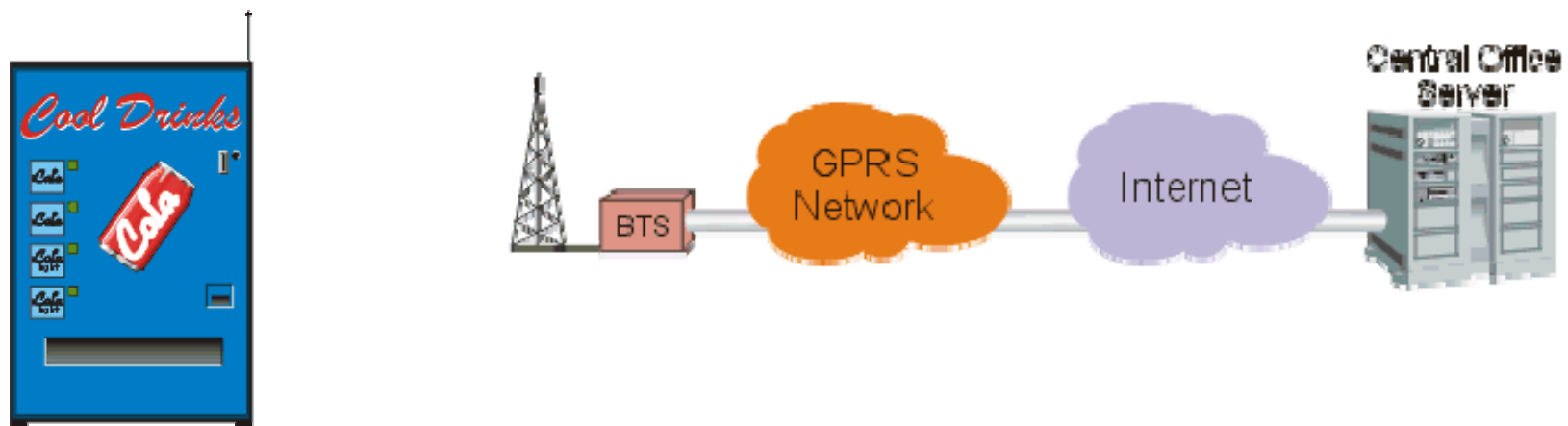
walking speed

vehicular speed

Application examples

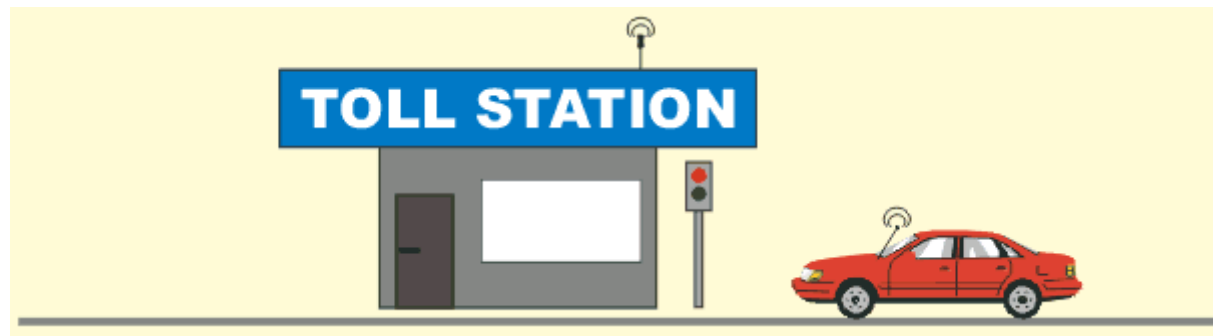
Telemetry

beverage vending machine sends it's state to a central office/warehouse



Application examples

toll collection



Application examples

surveillance



Types of mobile terminals



Phone



Smartphone



Notebook