MOBILE COMPUTING - INTRODUCTION

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AP/CSE

LEARNING OBJECTIVES

- To understand the basic concepts of mobile computing

WHAT IS MOBILE COMPUTING?

- Mobile Computing (Ubiquitous Computing / Nomadic Computing) is described as the ability to compute remotely while on the move.
- Fast and new emerging technology.
- People can access information from anywhere and anytime.
- Mobile Computing (2 distinct concepts)
  - Mobile Communication
    - The capability to change the location while communicating to invoke computing services at some remote computers.
  - Mobile Computing
    - The capability to automatically carry out certain processing related service invocations on a remote computer
- Provides flexibility to the user

MOBILE COMPUTING VS WIRELESS NETWORKING

- MC and WN are not same.
- Mobile Computing
  - Computing environment is mobile → sender or receiver is on the move while transmitting or receiving information.
  - Accessing Information and remote computational services on the move.
- Wireless Networks
  - Basic communication infrastructure necessary to make mobile computing possible.
- Therefore mobile computing is based on wireless networks

MOBILE COMMUNICATION

- Two aspects of mobility:
  - user mobility: users communicate (wireless) "anytime, anywhere, with anyone"
  - device portability: devices can be connected anytime, anywhere to the network

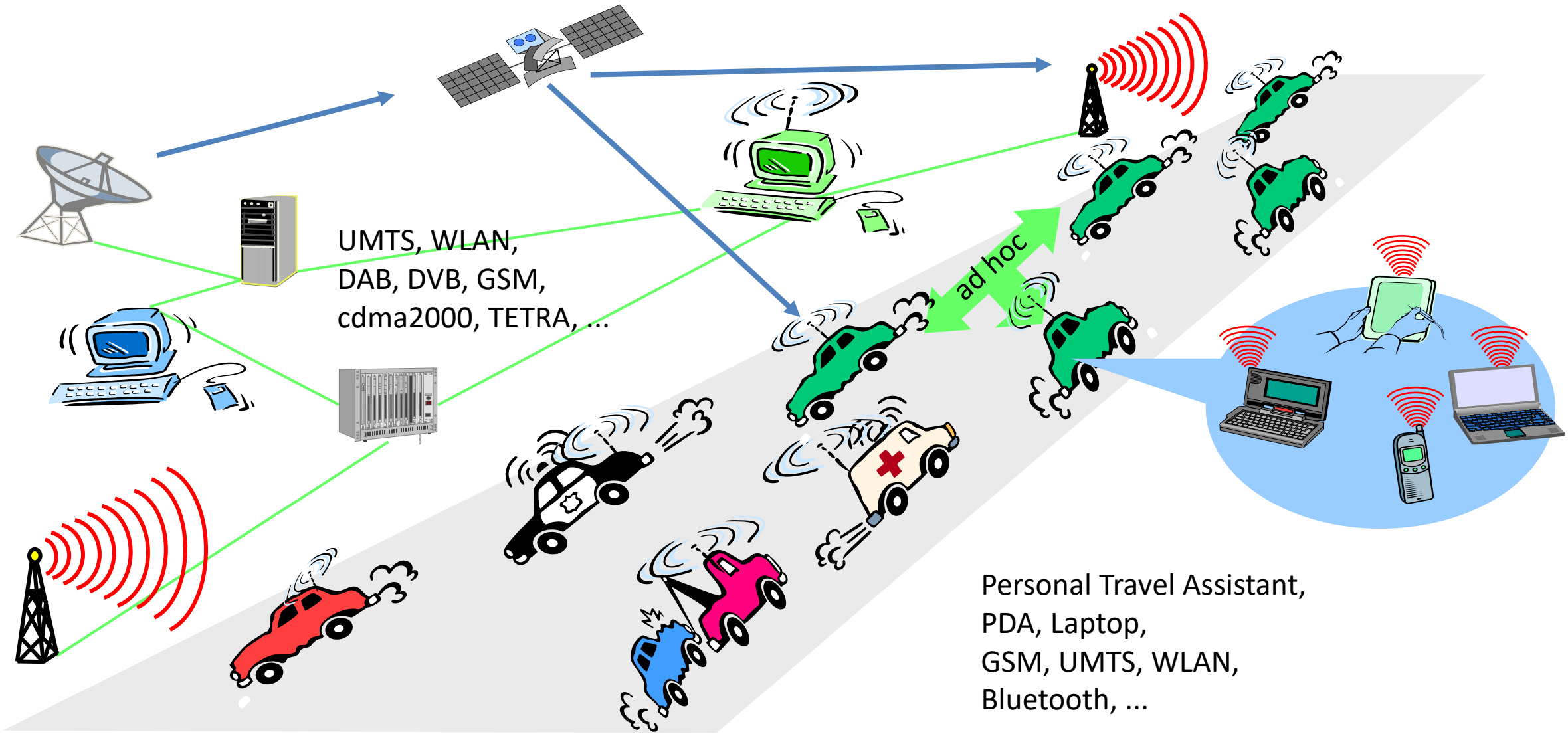
Wireless	mobile	Examples
✗	✗	desktop computer or a wired printer
✗	✓	a laptop computer or a tablet connected to a wired network
✓	✗	wireless router or a Wi-Fi printer
✓	✓	Smartphone, Tablet, Smart watch

- The demand for mobile communication creates the need for integration of wireless networks into existing fixed networks:
  - local area networks: standardization of IEEE 802.11 (**IEEE 802.11be -** Wi-Fi 7- Extremely High Throughput)
  - Internet: Mobile IP extension of the internet protocol IP (IPv6, **IPv6 over LTE,** IPv6 over 5G)
  - wide area networks: e.g., internetworking of GSM and ISDN, VoIP over WLAN and POTS

APPLICATIONS I

- Vehicles
  - transmission of news, road condition, weather, music via DAB/DVB-T
  - personal communication using GSM/UMTS/LTE
  - position via GPS
  - local ad-hoc network with vehicles close-by to prevent accidents, guidance system, redundancy
  - vehicle data (e.g., from busses, high-speed trains) can be transmitted in advance for maintenance
- Emergencies
  - early transmission of patient data to the hospital, current status, first diagnosis
  - replacement of a fixed infrastructure in case of earthquakes, hurricanes, fire etc.
  - crisis, war, ...

TYPICAL APPLICATION: ROAD TRAFFIC

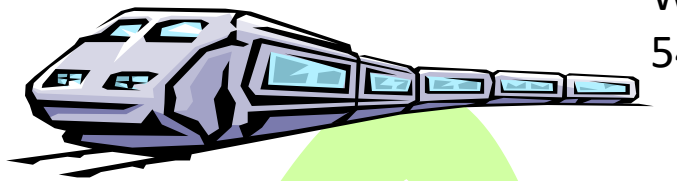


MOBILE AND WIRELESS SERVICES – ALWAYS BEST CONNECTED

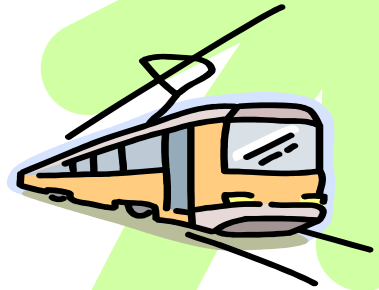
DSL/ WLAN
3 Mbit/s

GSM/GPRS 53 kbit/s
Bluetooth 500 kbit/s

UMTS, GSM
115 kbit/s



LAN
100 Mbit/s,
WLAN
54 Mbit/s



UMTS
2 Mbit/s

GSM/EDGE 384 kbit/s,
DSL/WLAN 3 Mbit/s

GSM 115 kbit/s,
WLAN 11 Mbit/s

UMTS, GSM
384 kbit/s

APPLICATIONS II

- Traveling salesmen
  - direct access to customer files stored in a central location
  - consistent databases for all agents
  - mobile office
- Replacement of fixed networks
  - remote sensors, e.g., weather, earth activities
  - flexibility for trade shows
  - LANs in historic buildings
- Entertainment, education, ...
  - outdoor Internet access
  - intelligent travel guide with up-to-date location dependent information
  - ad-hoc networks for multi user games

LOCATION DEPENDENT SERVICES

- Location aware services
  - what services, e.g., printer, fax, phone, server etc. exist in the local environment
- Follow-on services
  - automatic call-forwarding, transmission of the actual workspace to the current location
- Information services
  - "push": e.g., current special offers in the supermarket
  - "pull": e.g., where is the Black Forrest Cheese Cake?
- Support services
  - caches, intermediate results, state information etc. "follow" the mobile device through the fixed network
- Privacy
  - who should gain knowledge about the location

SUMMARY

- Mobile Computing
- Wireless Networks vs Mobile computing
- Applications of Mobile Computing

TEST YOUR KNOWLEDGE

How does SHAREit or SHARE Karo app work???

REFERENCES

- Jochen H Schiller, “Mobile Communications”, Pearson Education, New Delhi, 2nd Edition,2007