Mobile Computing
Lecture 9
Digital Mobile Phone Systems 2

Contents

- Architecture of the GSM system
- GSM Overview
- Elements & interfaces
- Subsystems

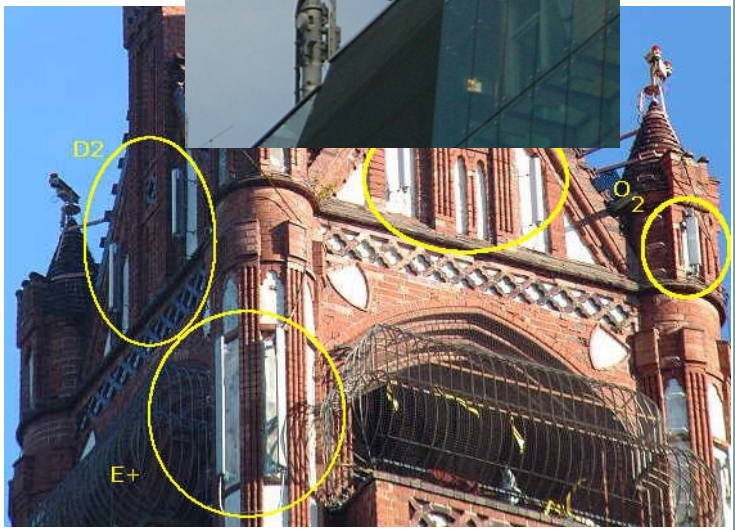
Architecture of the GSM system

- GSM is a PLMN (Public Land Mobile Network)
  - several providers setup mobile networks following the GSM standard within each country
  - components
    - MS (mobile station)
    - BS (base station)
    - MSC (mobile switching center)
    - LR (location register)
  - subsystems
    - RSS (radio subsystem): covers all radio aspects
    - NSS (network and switching subsystem): call forwarding, handover, switching
    - OSS (operation subsystem): management of the network

Ingredients 1: Mobile Phones, PDAs & Co.

The visible but smallest part of the network!

Ingredients 2: Antennas



Still visible – cause many discussions…

Ingredients 3: Infrastructure 1

Base Stations

Cabling

Microwave links

Ingredients 3: Infrastructure 2

Switching units

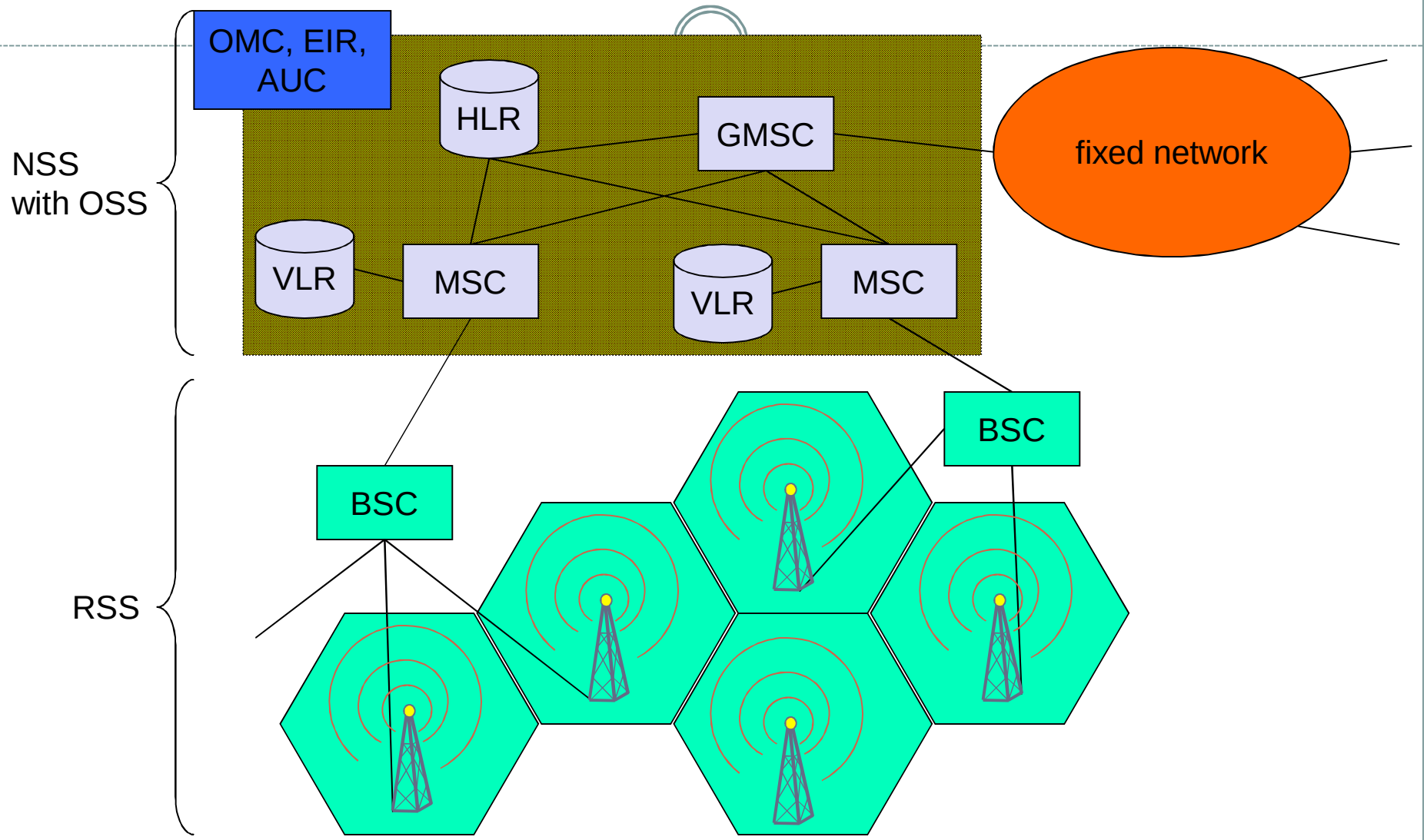
Management

Data bases

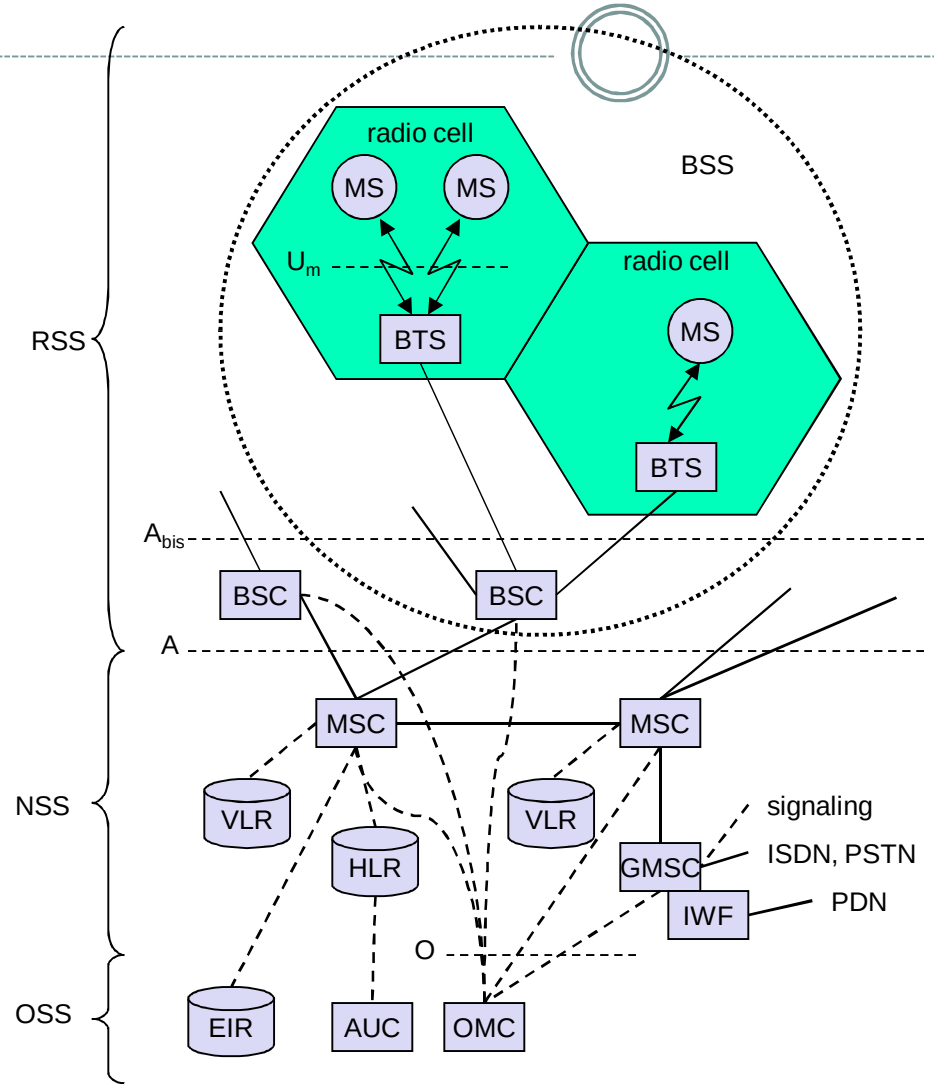
Monitoring

Not „visible“, but comprise the major part of the network (also from an investment point of view…)

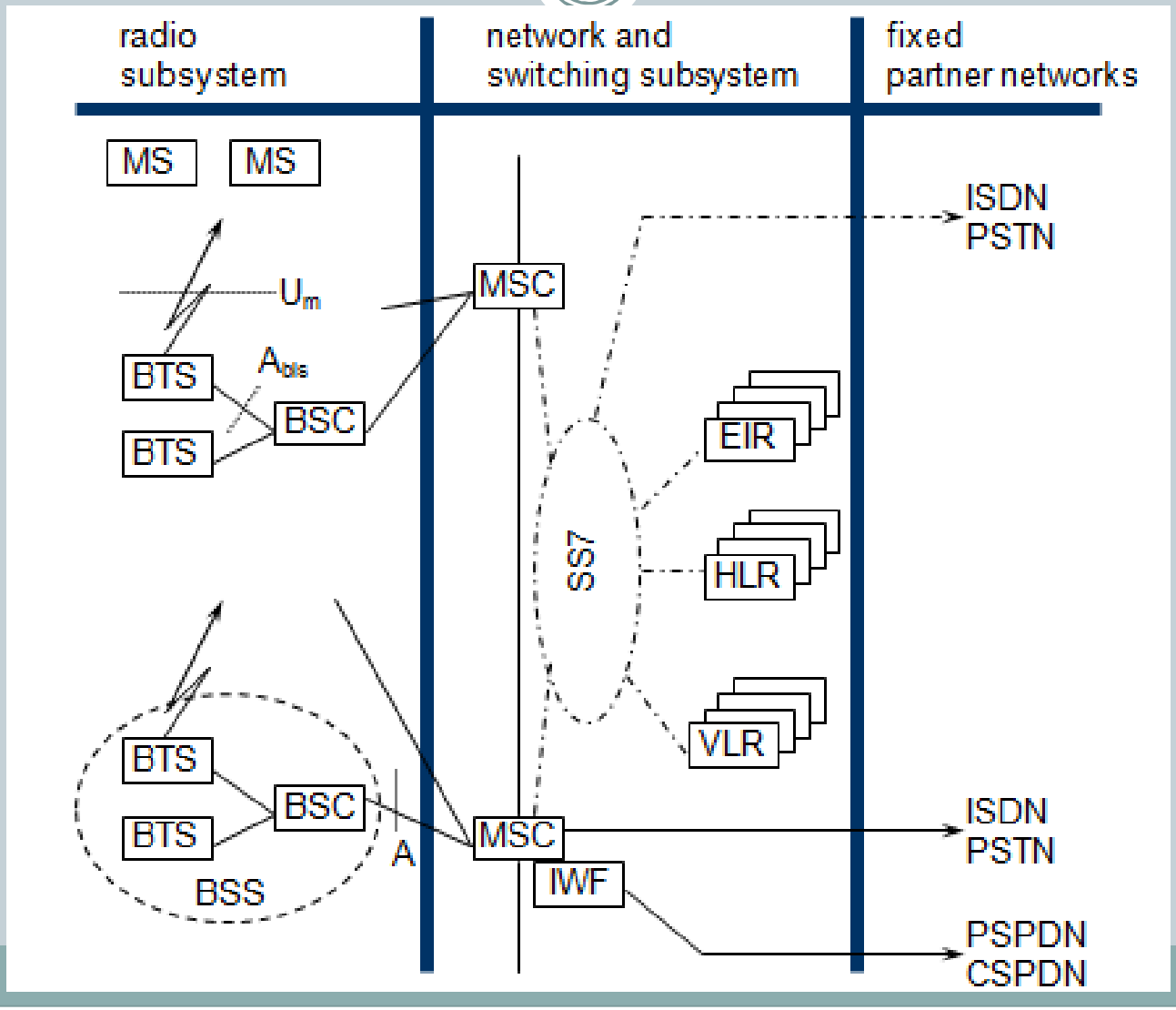
GSM: overview



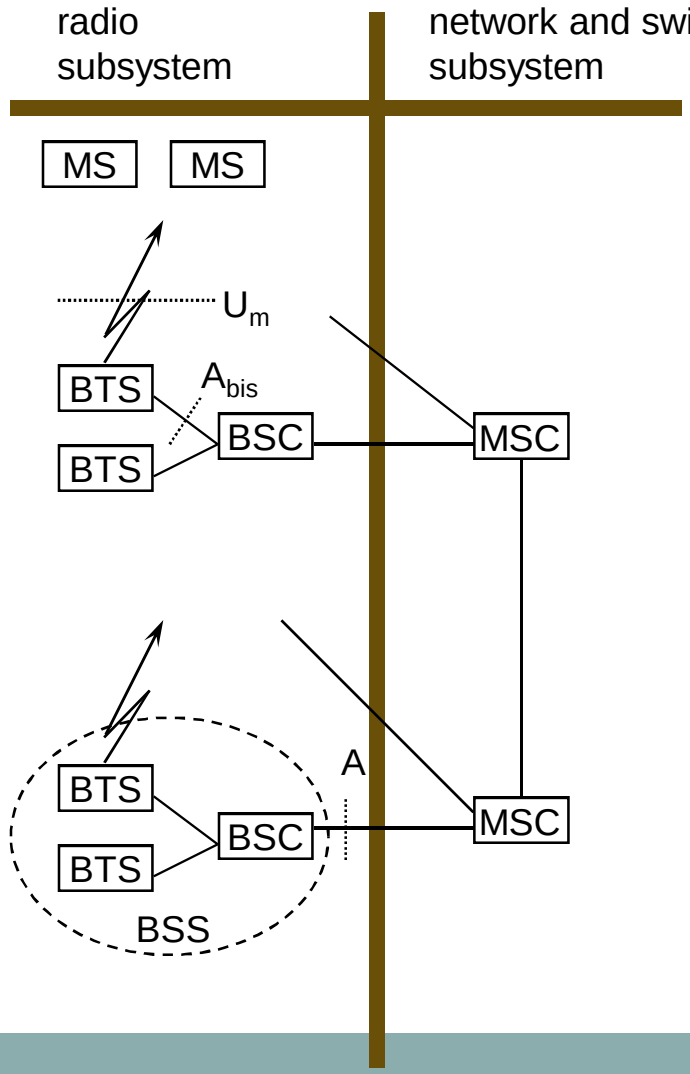
GSM: elements and interfaces



GSM: system architecture

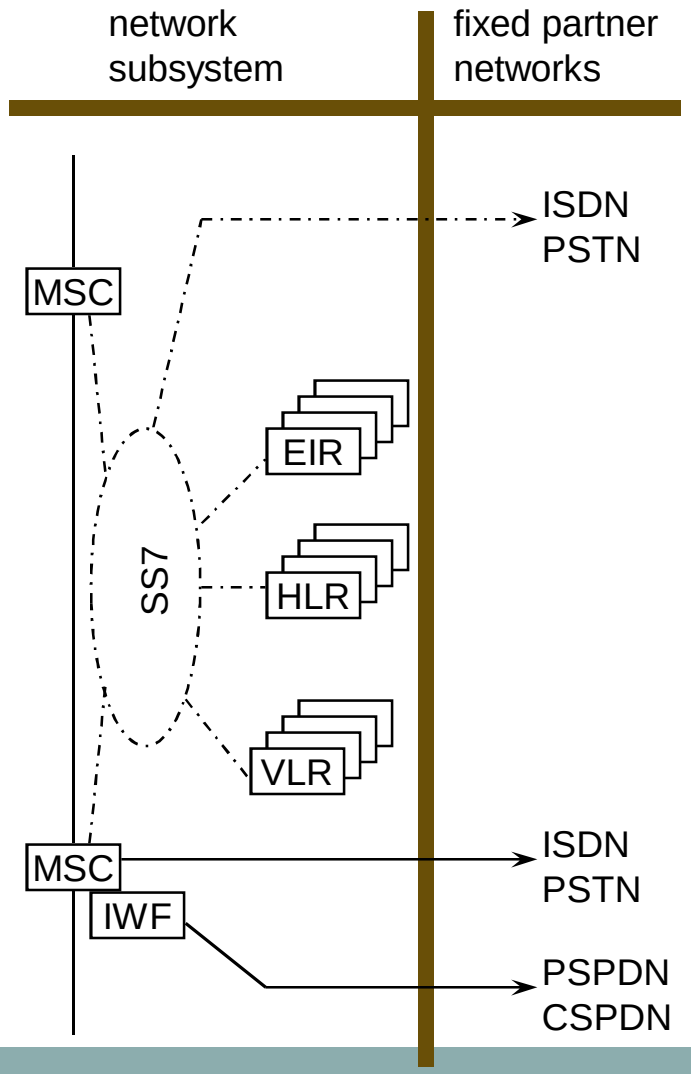


System architecture: radio subsystem



- Components
  - *MS* (Mobile Station)
  - *BSS* (Base Station Subsystem): consisting of
    - *BTS* (Base Transceiver Station): sender and receiver
    - *BSC* (Base Station Controller): controlling several transceivers
- Interfaces
  - U_m : radio interface
  - A_{bis} : standardized, open interface with 16 kbit/s user channels
  - *A*: standardized, open interface with 64 kbit/s user channels

System architecture: network and switching subsystem



- Components
  - MSC (Mobile Services Switching Center):
  - IWF (Interworking Functions)
  - ISDN (Integrated Services Digital Network)
  - PSTN (Public Switched Telephone Network)
  - PSPDN (Packet Switched Public Data Net.)
  - CSPDN (Circuit Switched Public Data Net.)

- Databases
  - HLR (Home Location Register)
  - VLR (Visitor Location Register)
  - EIR (Equipment Identity Register)

Radio subsystem

- The Radio Subsystem (RSS) comprises the cellular mobile network up to the switching centers
- Components
  - Base Station Subsystem (BSS):
    - Base Transceiver Station (BTS): radio components including sender, receiver, antenna - if directed antennas are used one BTS can cover several cells
    - Base Station Controller (BSC): switching between BTSs, controlling BTSs, managing of network resources, mapping of radio channels (U_m) onto terrestrial channels (A interface)
    - BSS = BSC + sum(BTS) + interconnection
  - Mobile Stations (MS)