Bahan Ajar

Chapter 4

Materi Pembelajaran

Matakuliah :

WIRELESS SENSOR NETWORKS

Kode Matakuliah : SKO 20428

Prodi : SISTEM KOMPUTER

Dosen Pengampu Matakuliah:

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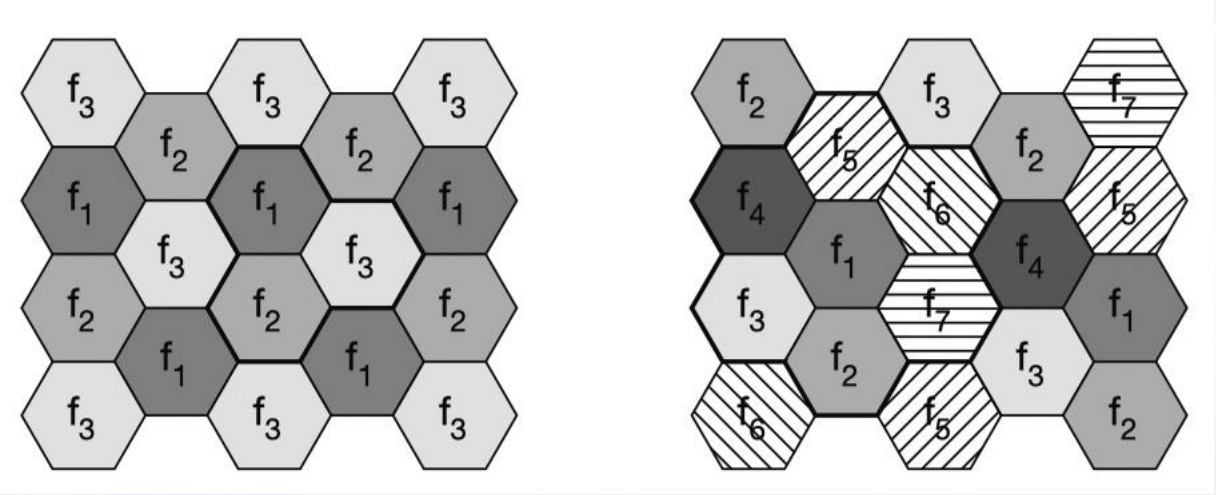
Cellular systems

Cellular systems for mobile communications implement SDM. Each transmitter, typically called a base station, covers a certain area, a cell.



Cellular system with three and seven cell clusters

Cellular systems

Advantages of cellular systems with small cells are the following:

- Higher capacity
- Less transmission power
- Local interference only
- Robustness

Cellular systems

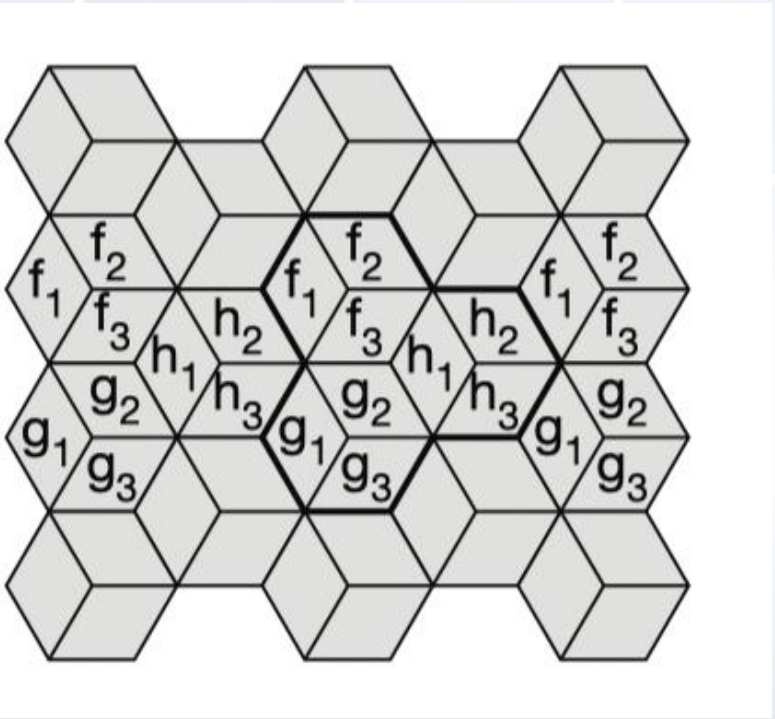
Small cells also have some disadvantages:

- Infrastructure needed
- Handover needed
- Frequency planning

To avoid interference, different transmitters within each other's interference range use FDM. If FDM is combined with TDM, the hopping pattern has to be coordinated.

Cellular systems

Cellular system with three cell clusters and three sectors per cell.

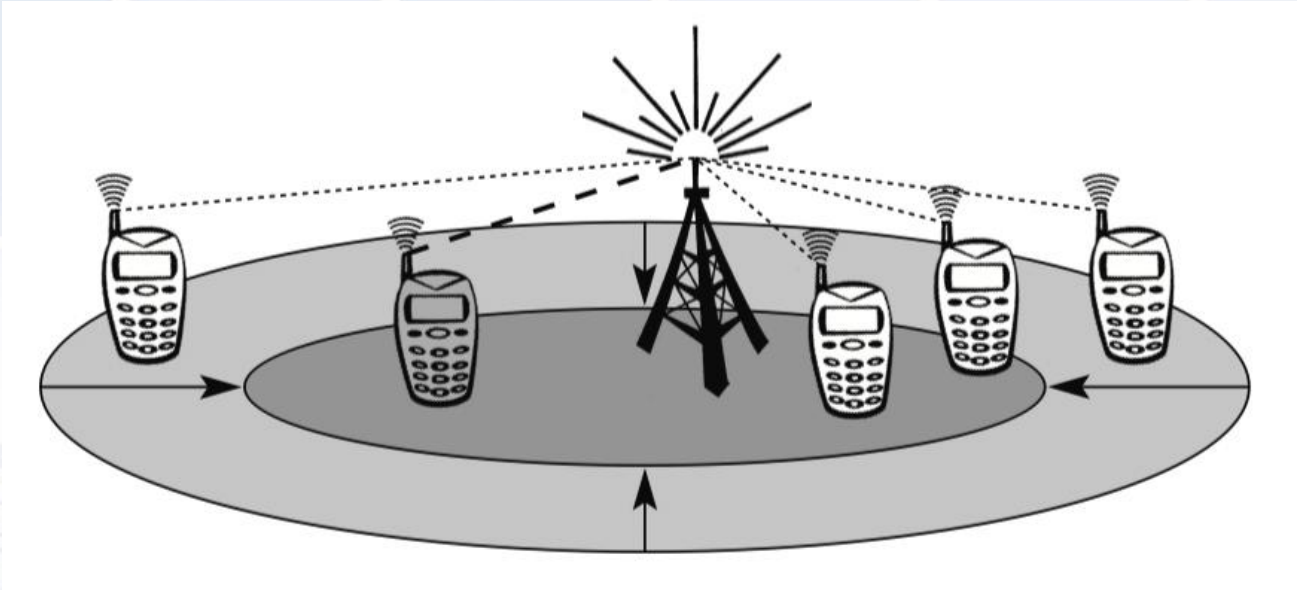


Cellular systems

Cellular systems using CDM instead of FDM do not need such elaborate channel allocation schemes and complex frequency planning. Here, users are separated through the code they use, not through the frequency. Cell planning faces another problem – the cell size depends on the current load. Accordingly, CDM cells are commonly said to ‘breathe’. While a cell can cover a larger area under a light load, it shrinks if the load increases.

Cellular systems

Cell breathing depending on the current load.



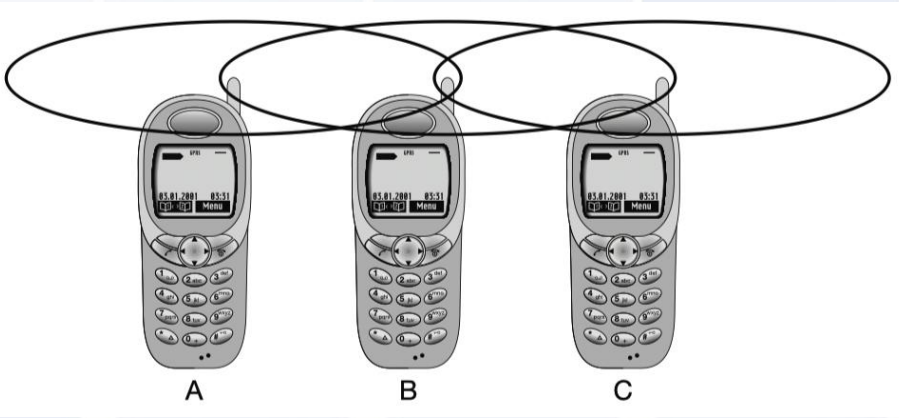
Medium Access Control (MAC)

Medium access control comprises all mechanisms that regulate user access to a medium using SDM, TDM, FDM, or CDM. MAC is thus similar to traffic regulations in the highway/multiplexing.

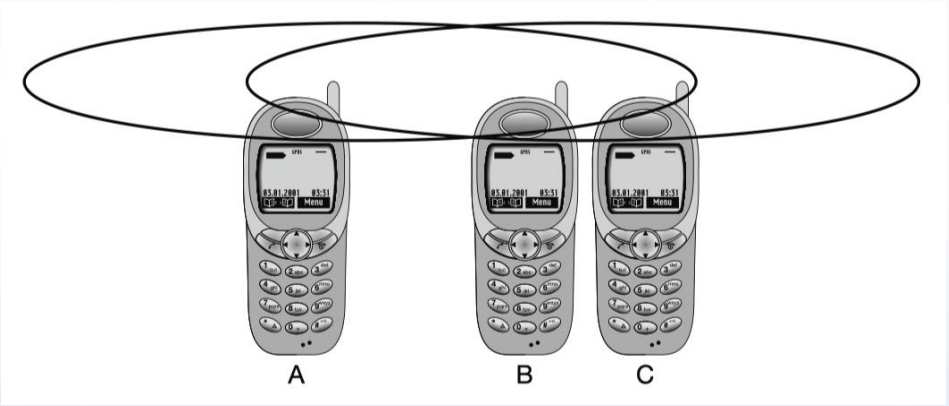
MAC belongs to layer 2, the data link control layer (DLC). Layer 2 is subdivided into the logical link control (LLC), layer 2b, and the MAC, layer 2a (Halsall, 1996).

Problem in Cellular

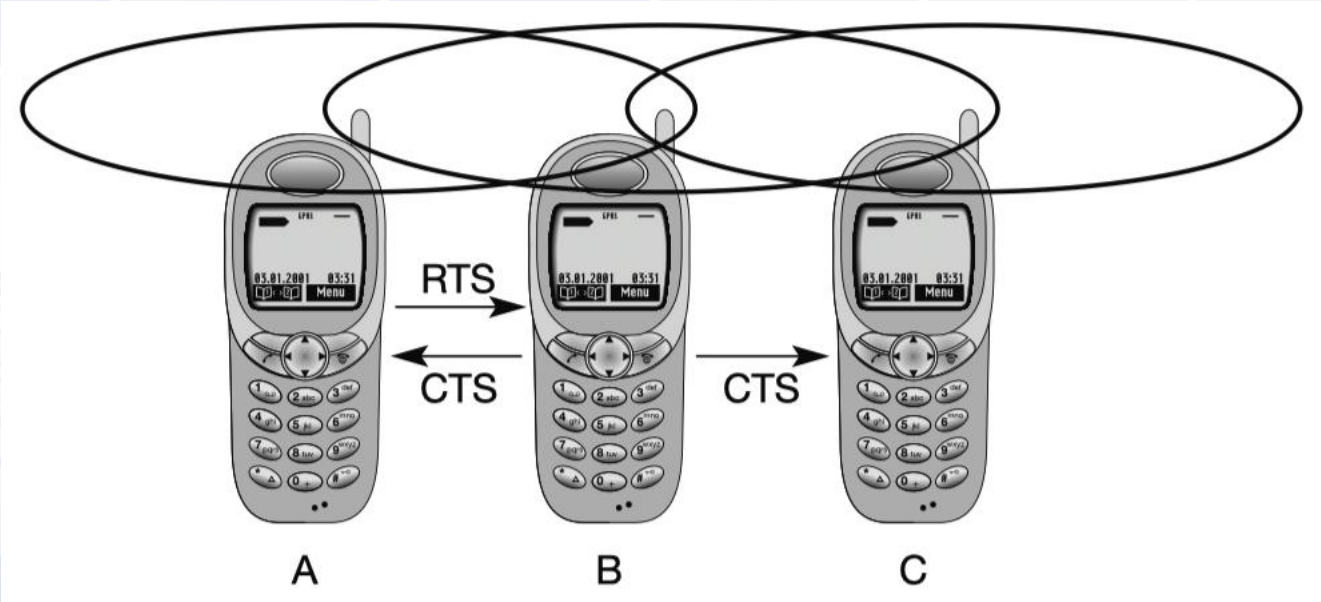
Hidden and exposed terminals



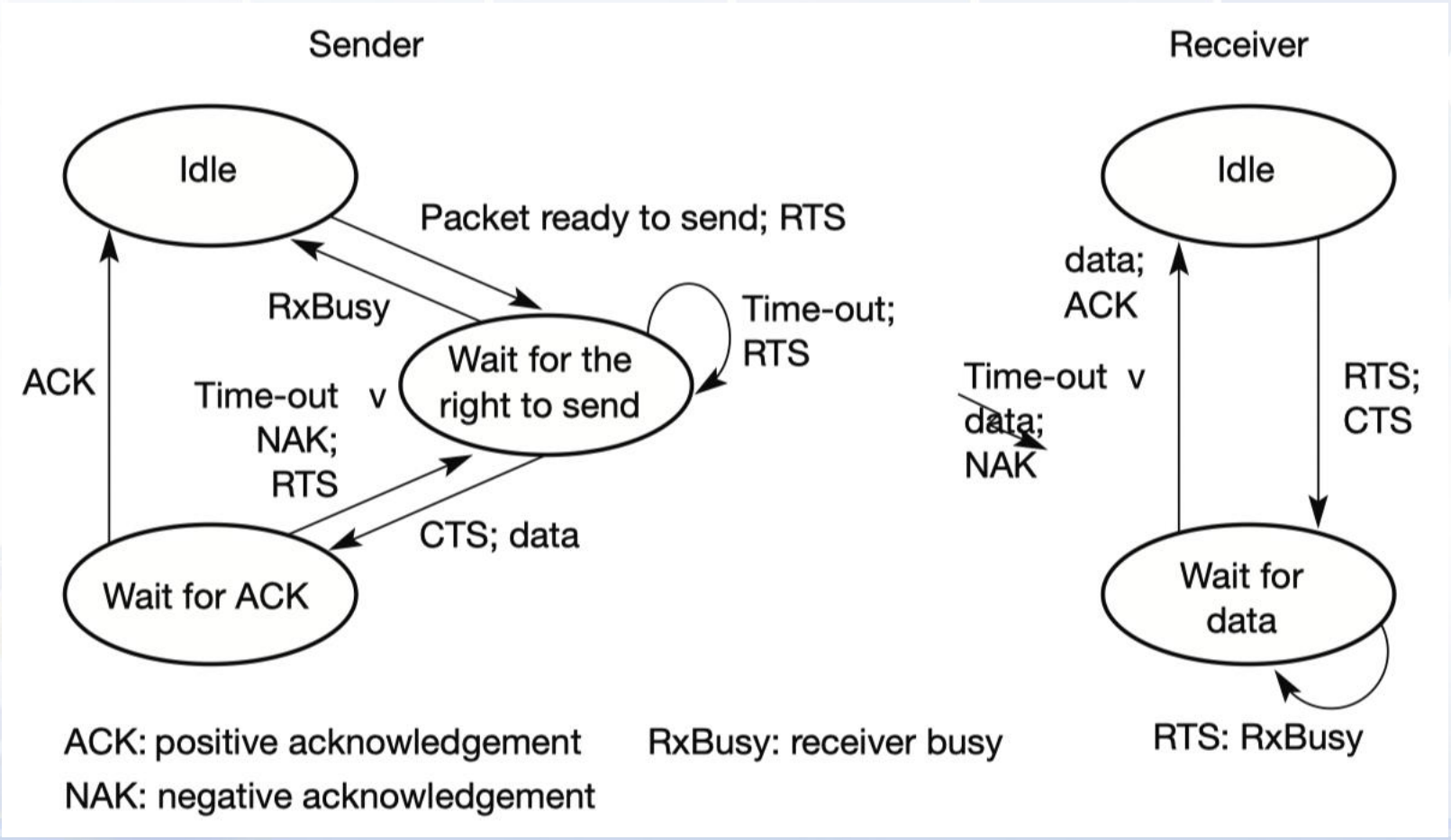
Near and far terminals



Multiple access with collision avoidance (MACA) presents a simple scheme that solves the hidden terminal problem, does not need a base station, and is still a random access Aloha scheme – but with dynamic reservation.



Protocol machines for multiple access with collision avoidance.



Tugas Mandiri (teori):

1. What is the main physical reason for the failure of many MAC schemes known from wired networks? What is done in wired networks to avoid this effect?
2. Assume all stations can hear all other stations. One station wants to transmit and senses the carrier idle. Why can a collision still occur after the start of transmission?.

Tugas Mandiri (praktikum):

Rancang penyebaran beberapa node di Network Simulator.

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