# M8. MAC layer protocols

We can classify multiple access protocol into three categories: channel partitioning protocols, random access protocols and taking turns. Please explain their principle respectively.

## Channel Partitioning Protocols

Consists of three different types of sending methods. Different ways of dividing information into channels.

**TDM (Time-division multiplexing)**

Splits time in frames and further in intervals. Each node is allocated separate intervals.  
Pro: Everything is shared fairly.  
Con: The entire bandwidth won’t be used if all intervals don’t send packages.

**FDM (Frequency-division multiplexing)**

Splits the data in different frequencies. Each node is allocated a frequency.  
Pro: Shared fairly.  
Con: The entire bandwidth won’t be used if all frequencies don’t send packages.

**CDMA(Code-division mutliple access)**Allocates different coding to each node. Each node encodes each package with its own coding.  
Several nodes can be sent at the same time on the same channel, if the receiver knows the coding on the received packages.

## Random Access Protocols

**Slotted ALOHA**

All nodes send packages in the beginning of an interval, if there is a collision the packages will be sent in the next interval.  
This will ensure that the entire bandwidth will be used, though on the cost of synchronization of the intervals.

**ALOHA**

The difference between ALOHA and slotted ALOHA, is that ALOHA waits until a certain timespace instead of an interval after a collision.  
This doesn’t have to be synchronized, but is only half as fast as Slotted ALOHA.

**CSMA (Casier Sense Multiple Access)**

Detects if there is other nodes sending, if this is true it waits a short interval (backoff delay) before trying to send the package again.  
If there is any collisions, it is registered and detected to reduce following collisions.

## Taking Turns Protocol

**Polling protocols**

One node is designated as master node. The master node polls each of the nodes in a round-robin fashion and decides which tokens should be able to send packages.

**Token passing protocols**

A token changing to the nodes, the node with the token can send packages.  
Effective but may be destroyed by a node not willing to send the token to the next node.