

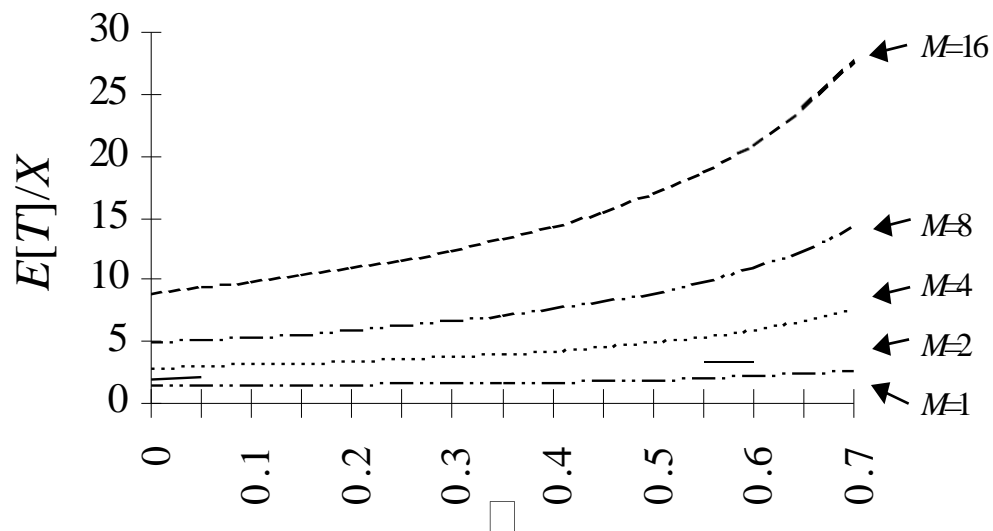
# Channelization

## Why Channelization?

- Channelization
  - Semi-static bandwidth allocation of portion of shared medium to a given user
- Highly efficient for constant-bit rate traffic
- Preferred approach in
  - Cellular telephone networks
  - Terrestrial & satellite broadcast radio & TV

# Why not Channelization?

- Inflexible in allocation of bandwidth to users with different requirements
  - Inefficient for bursty traffic
  - Does not scale well to large numbers of users
- Average transfer delay increases with number of users  $M$
- Dynamic MAC much better at handling bursty traffic

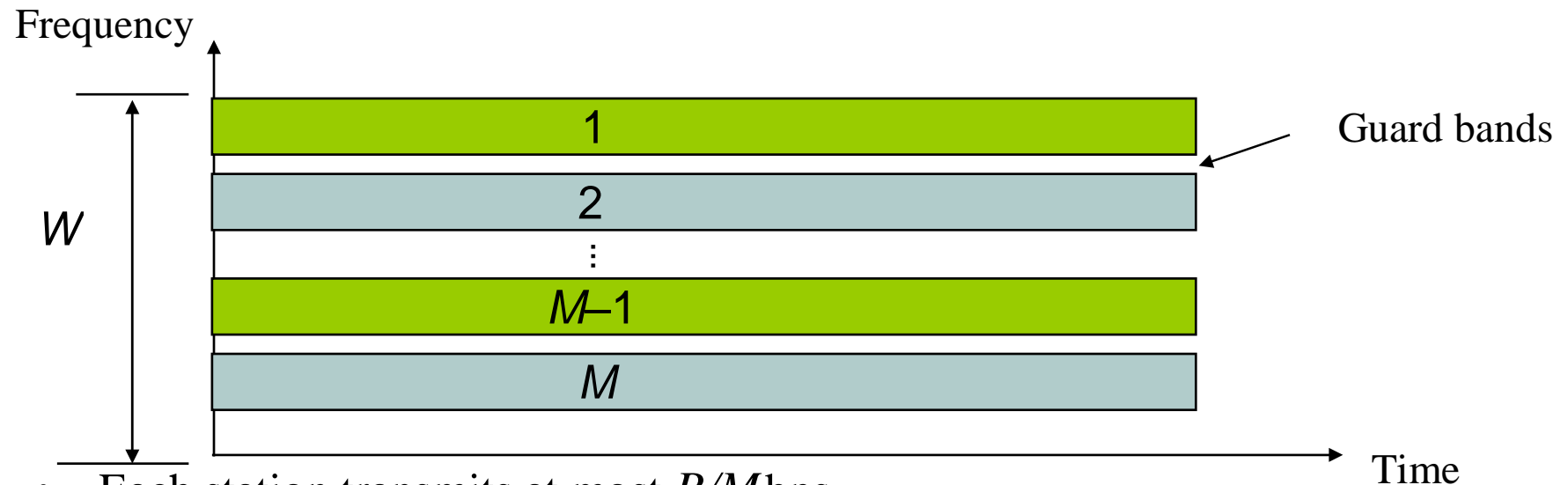


# Channelization Approaches

- *Frequency Division Multiple Access (FDMA)*
  - Frequency band allocated to users
  - Broadcast radio & TV, analog cellular phone
- *Time Division Multiple Access (TDMA)*
  - Periodic time slots allocated to users
  - Telephone backbone, GSM digital cellular phone

# Channelization: FDMA

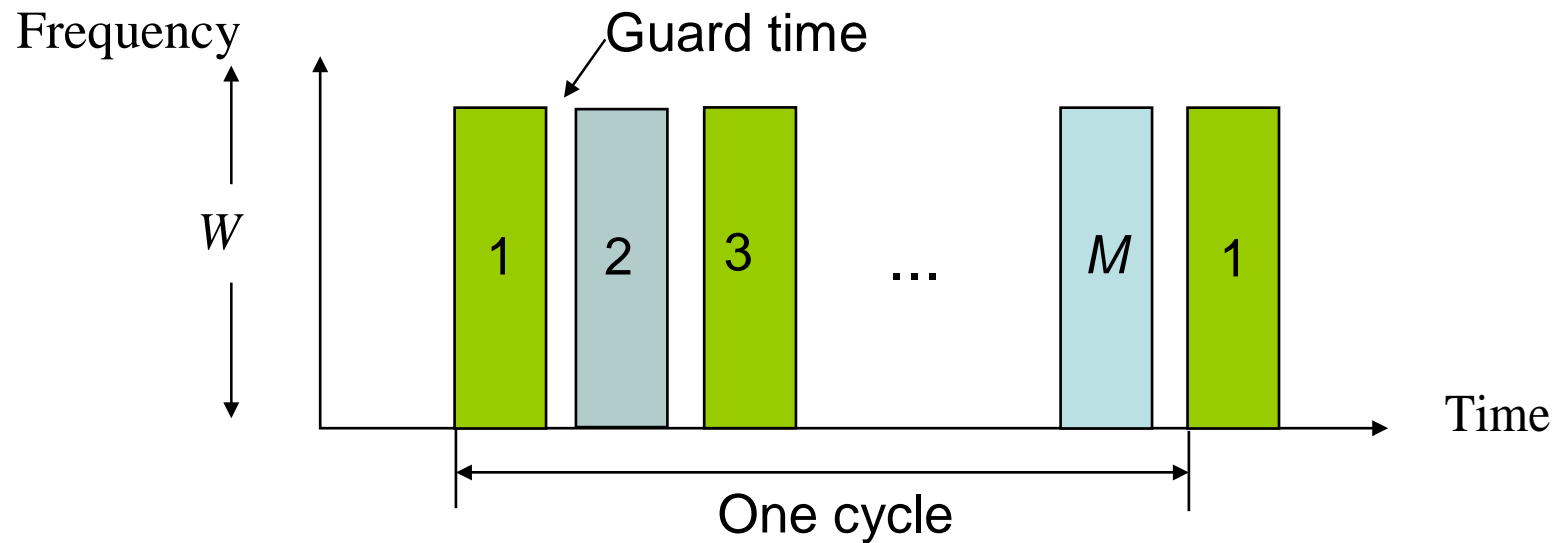
- Divide channel into  $M$  frequency bands
- Each station transmits and listens on assigned bands



- Each station transmits at most  $R/M$  bps
- Good for stream traffic;      Used in connection-oriented systems
- Inefficient for bursty traffic

# Channelization: TDMA

- Dedicate 1 slot per station in transmission cycles
- Stations transmit data burst at full channel bandwidth



- Each station transmits at  $R$  bps  $1/M$  of the time
- Excellent for stream traffic; Used in connection-oriented systems
- Inefficient for bursty traffic due to unused dedicated slots

# Guardbands

- FDMA
  - Frequency bands must be non-overlapping to prevent interference
  - Guardbands ensure separation; form of overhead
- TDMA
  - Stations must be synchronized to common clock
  - Time gaps between transmission bursts from different stations to prevent collisions; form of overhead
  - Must take into account propagation delays

THANK YOU.....