

# Computer Networks

## Multiplexing (§2.5.3, 2.5.4)



David Wetherall (djw@uw.edu)

Professor of Computer Science & Engineering

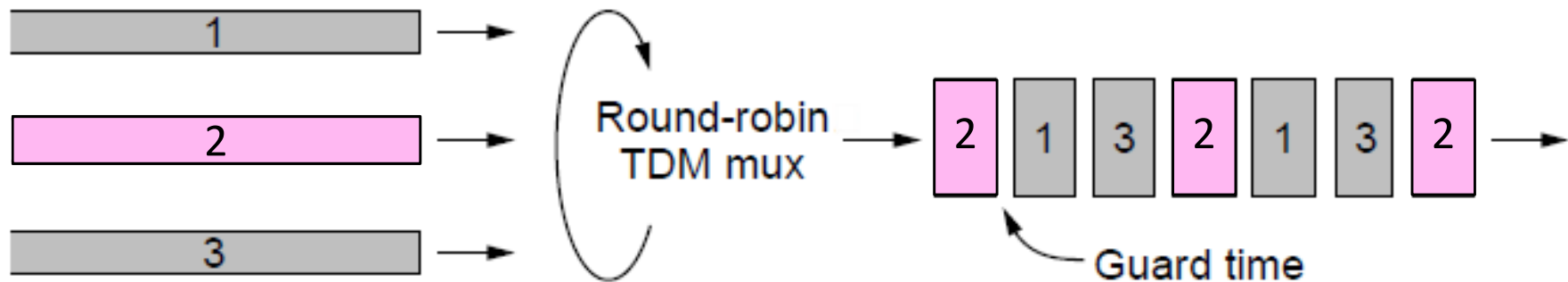
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# Topic

- Multiplexing is the network word for the sharing of a resource
- Classic scenario is sharing a link among different users
  - Time Division Multiplexing (TDM) »
  - Frequency Division Multiplexing (FDM) »

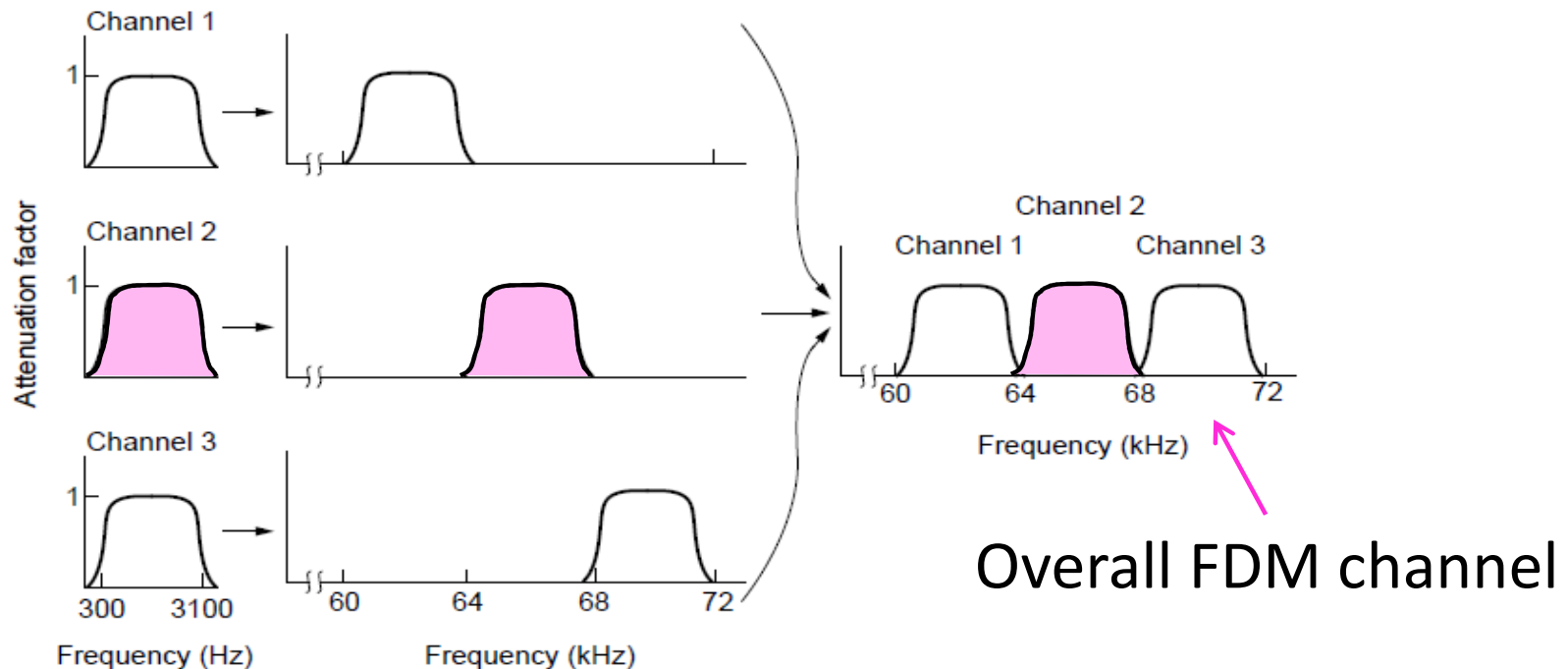
# Time Division Multiplexing (TDM)

- Users take turns on a fixed schedule



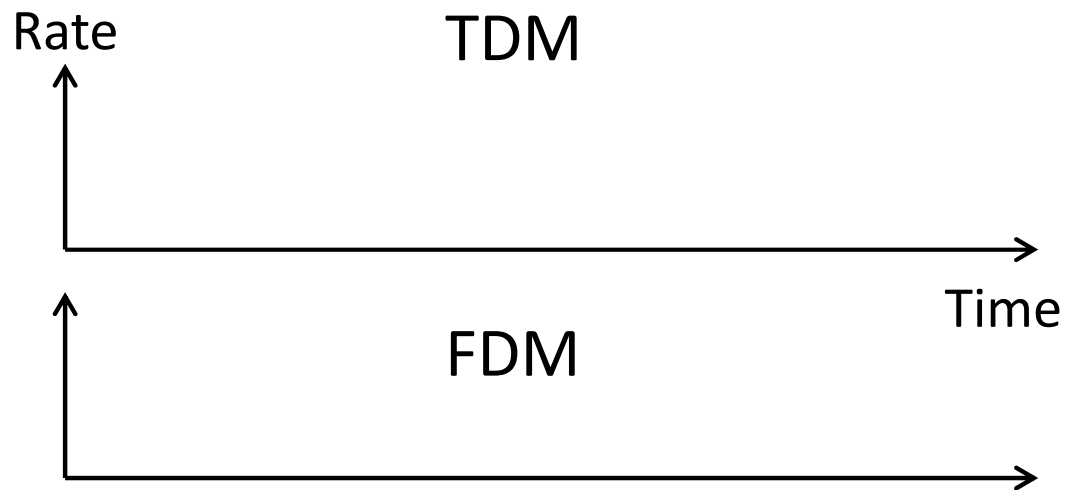
# Frequency Division Multiplexing (FDM)

- Put different users on different frequency bands



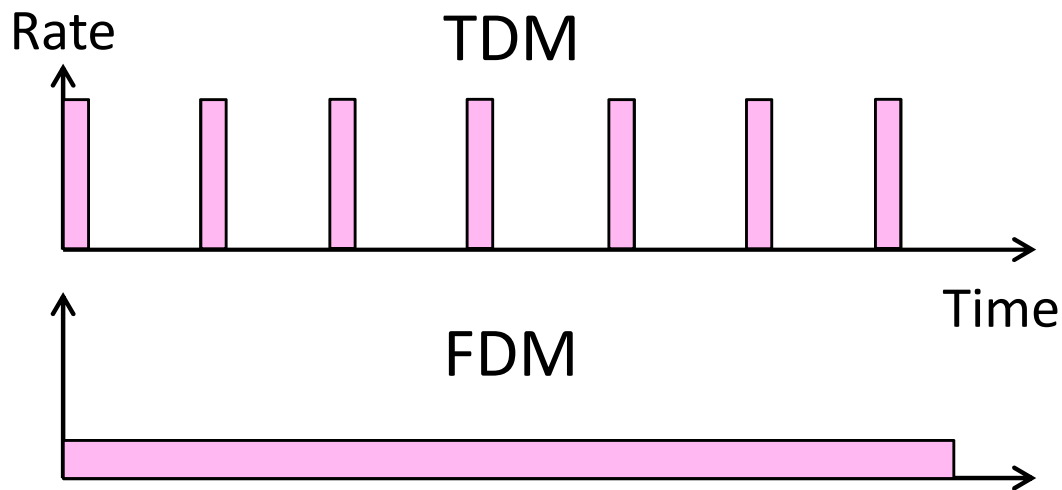
# TDM versus FDM

- In TDM a user sends at a high rate a fraction of the time; in FDM, a user sends at a low rate all the time



## TDM versus FDM (2)

- In TDM a user sends at a high rate a fraction of the time; in FDM, a user sends at a low rate all the time

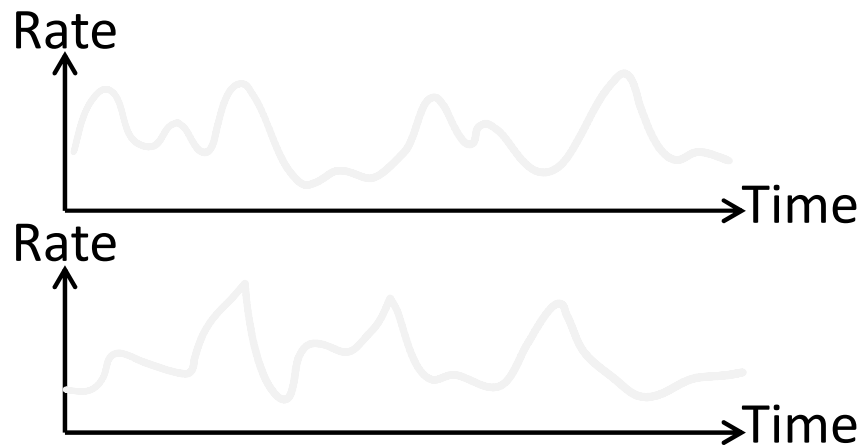


# TDM/FDM Usage

- Statically divide a resource
  - Suited for continuous traffic, fixed number of users
- Widely used in telecommunications
  - TV and radio stations (FDM)
  - GSM (2G cellular) allocates calls using TDM within FDM

# Multiplexing Network Traffic

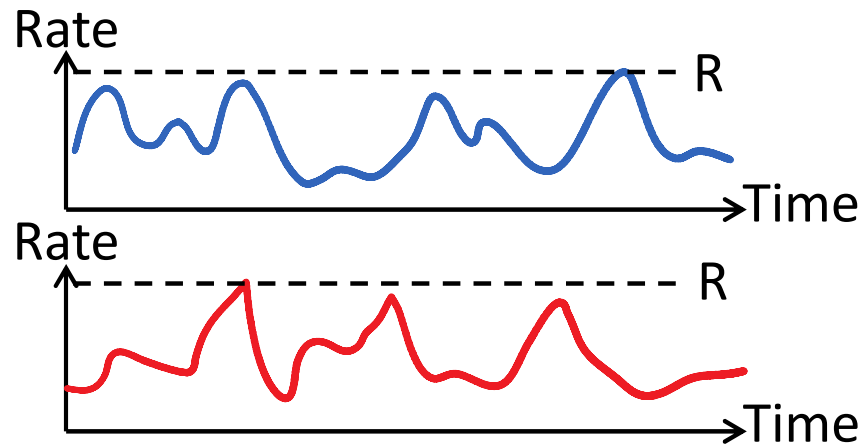
- Network traffic is bursty
  - ON/OFF sources
  - Load varies greatly over time





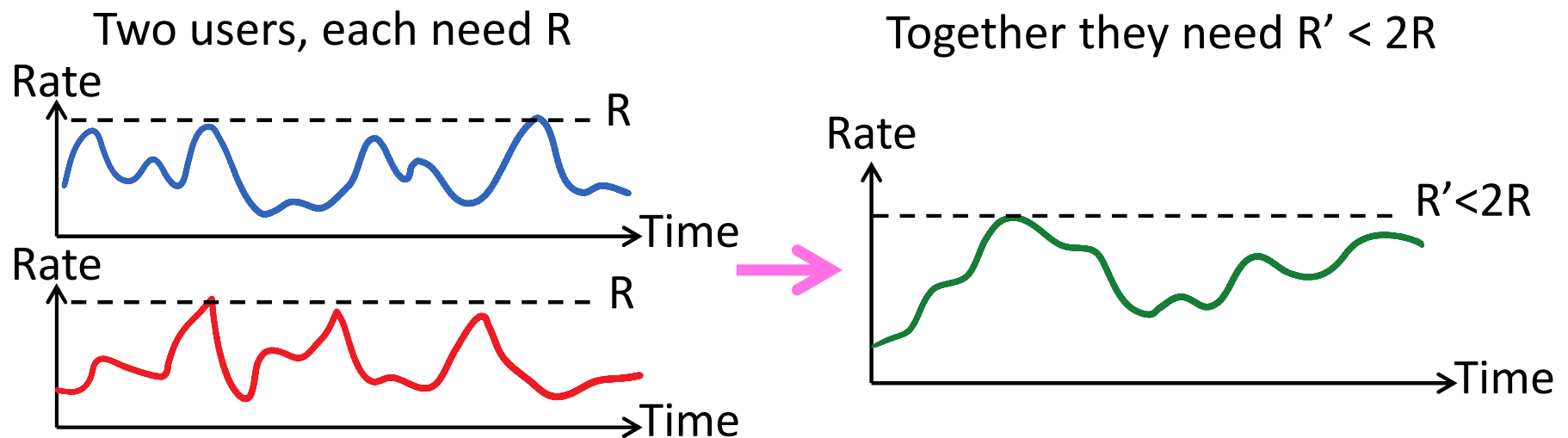
# Multiplexing Network Traffic (2)

- Network traffic is bursty
  - Inefficient to always allocate user their ON needs with TDM/FDM



# Multiplexing Network Traffic (3)

- Multiple access schemes multiplex users according to their demands – for gains of statistical multiplexing



# Multiple Access

- We will look at two kinds of multiple access protocols
  1. Randomized. Nodes randomize their resource access attempts
    - Good for low load situations
  2. Contention-free. Nodes order their resource access attempts
    - Good for high load or guaranteed quality of service situations

# END

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