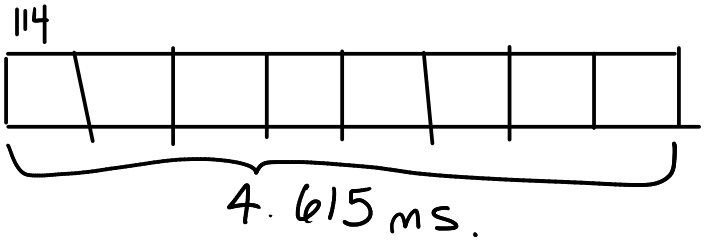
Duplexing and Multiple-Access Techniques

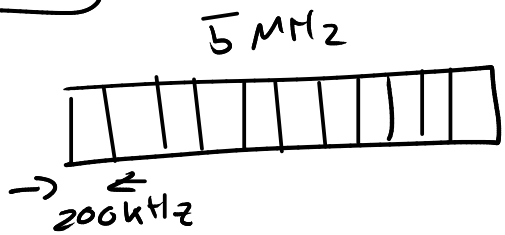
Exercise 1: Is a normal phone call half-duplex, full-duplex or simplex? How about a radio broadcast? A typical police dispatch radio using push-to-talk (PTT)?

phone call – full duplex
radio – simplex
PTT – half duplex

Exercise 2: GSM cellular systems use FDD and TDMA. Each user gets to transmits 114 bits in one of eight "slots" per frame and each frame lasts is 4.615 ms long. What is the average data rate for each user? GSM channels are spaced every 200 kHz. An operator has one 5 MHz frequency allocation for each direction ("paired" spectrum). How many channels can this operator use?



$$\frac{114}{4.615 \times 10^{-3}} = 24.7 \text{ kb/s}$$



$$\frac{5 \times 10^{6}}{200 \times 10^{3}} = 25 \text{ channels.}$$

$25 \times 8 = 400$ users simultaneously.