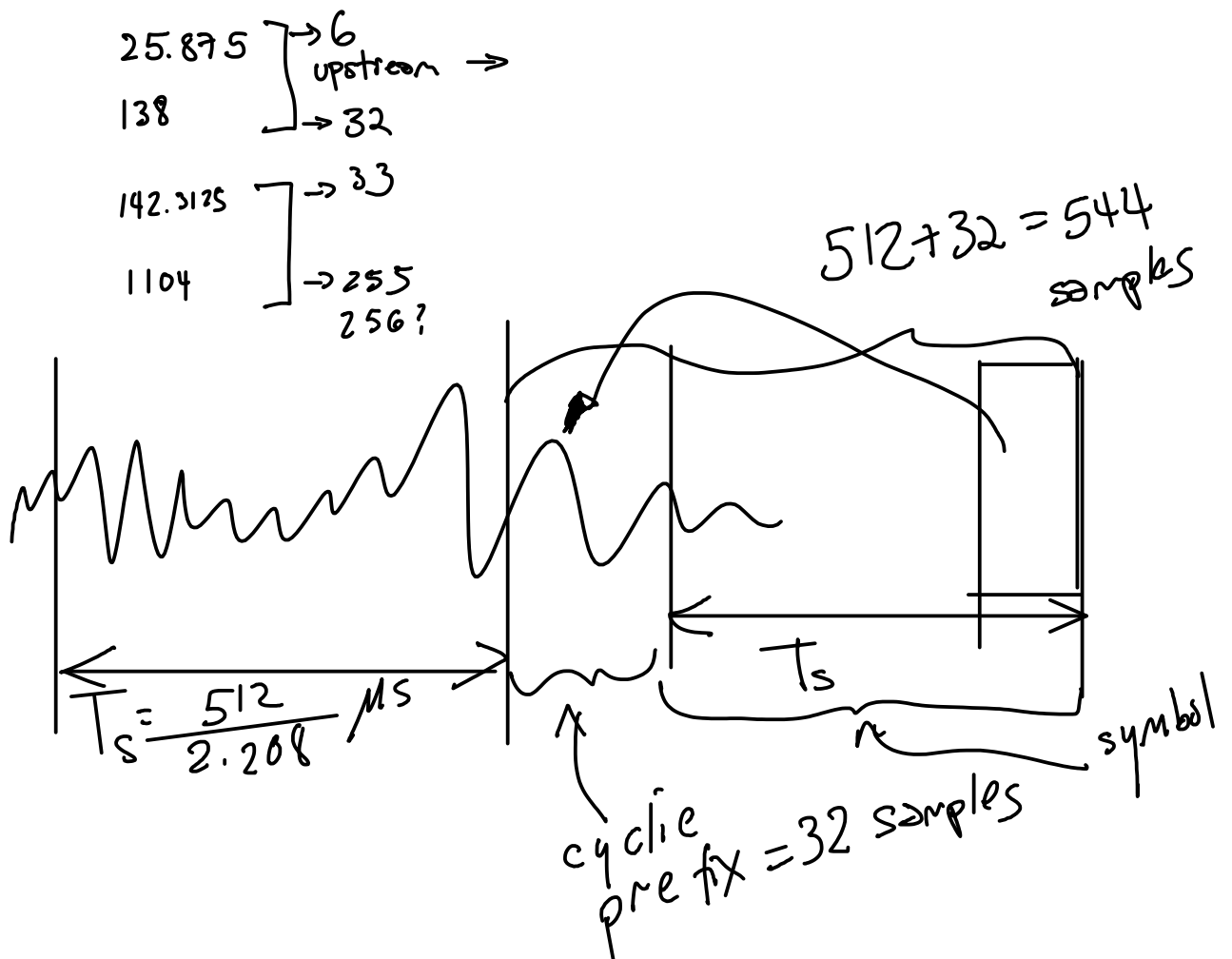# Lecture 7

Exercise 1: Based on the diagram above, are the ADSL signals higher or lower in frequency than the conventional telephone signals?

ADSL is higher in freq.

Exercise 2: What ranges of subcarrier numbers are used for the upstream and downstream?

$\div 4.3125$

$25.875 \rightarrow 6$

upstream $\Rightarrow$

$138 \rightarrow 32$

$142.3125 \rightarrow 33$

$1104 \rightarrow 255$

$256?$

$512 + 32 = 544$ samples

$T_s = \dfrac{512}{2.208} \mu s$

T_s

cyclic prefix = 32 samples

symbol

Exercise 3: Is this an additive or convolutional (multiplicative) interleaver? Does it need framing synchronization?

— convolutional scrambler

— no (self-synchronizing)

Exercise 4: How many errors per codeword can be corrected?

— can correct up to half the number of parity symbols

$0 \rightarrow 0$ error

$16 \rightarrow$ up to 8 errors per block

frequency response of twisted pair