

⑥

$$K_{\max} = \left\lfloor \frac{F_H}{B} \right\rfloor$$

$$F_H = 1575.42 + \frac{4}{2} = 1577.42 \text{ MHz}$$

$$F_L = 1575.42 - \frac{4}{2} = 1573.42 \text{ MHz}$$

$$= \left\lfloor \frac{1577.42}{4} \right\rfloor$$

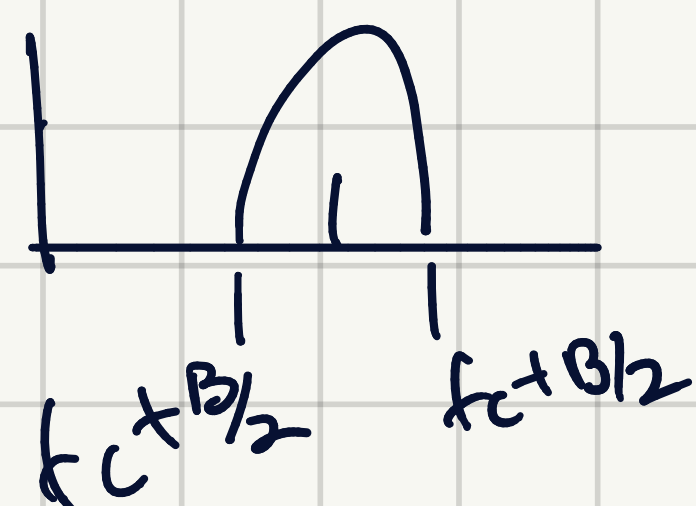
$$= \lfloor 394.3550 \rfloor$$

$$= 394$$

$$f_{s,\min} = \frac{2F_H}{K} = \frac{2(1577.42)}{394} = 8.0072 \text{ MHz}$$

$$f_s = f_{s,\min} / 0.8 = 10.0090 \text{ MHz}$$

$$\frac{f_s}{B} = \frac{10.0090}{4} = 2.5023$$



Based on how the spikey hair plot looks like the wedge area near $K=394$ will be super narrow, so even a slight variation will put us into the shaded region and cause aliasing. You can't blindly increase sampling rate.

If $W = B/0.8$
 $= 4/0.8 = 5 \text{ MHz}$

$$K_{\max} = \left\lfloor \frac{1580}{5} \right\rfloor$$

$$= 316$$

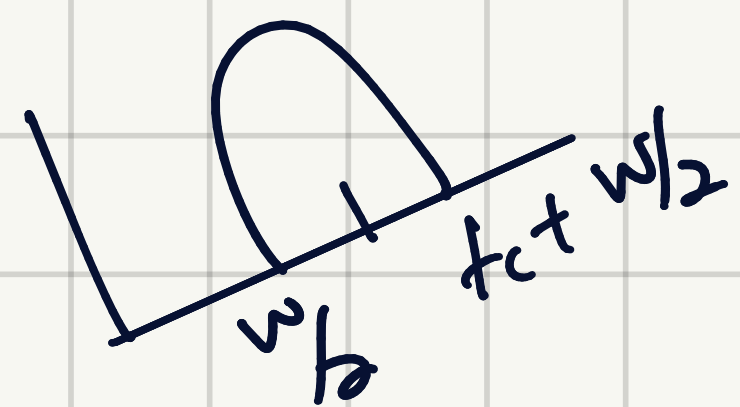
$$f_H = mW ; m = 316$$

$$= 316(5) = 1580 \text{ MHz}$$

$$f_s = 2W = 10 \text{ MHz}$$

$$f_{s,\min} = \frac{2(1580)}{316} = 10 \text{ MHz}$$

ASK



this frequency range is right on one of the tips of a wedge, so it is allowed but even a slight variation will move the sampling frequency into the shaded area of the spikey hair plot and cause aliasing.

This is not enough to avoid aliasing because variation of sampling rate or carrier frequency could occur.

Implement Guard Bands,

Let's add two guard bands of $\Delta B_L = 0.5 \text{ MHz}$
 $\Delta B_H = 0.5 \text{ MHz}$

$$B = 4 \text{ MHz}$$

$$B' = B + \Delta B_L + \Delta B_H \\ = 4 + 1 = 5$$

$$F'_L = F_L - \Delta B_L = 1573.42 - 0.5 = 1572.92 \text{ MHz}$$

$$F'_H = F_H + \Delta B_H = 1577.42 + 0.5 = 1577.92 \text{ MHz}$$

$$k'_{\max} = \left\lfloor \frac{F'_H}{B'} \right\rfloor = \left\lfloor \frac{1577.92}{5} \right\rfloor = 315$$

$$\frac{2F'_H}{k'} \leq F_s \leq \frac{2F'_L}{k'-1}$$

$$\frac{2(1577.92)}{315} \leq F_s \leq \frac{2(1572.92)}{314}$$

$$(10.0185397 \leq F_s \leq 10.0185987) \text{ MHz}$$