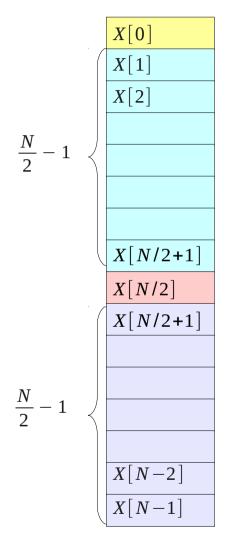
DFT Analysis (5B)

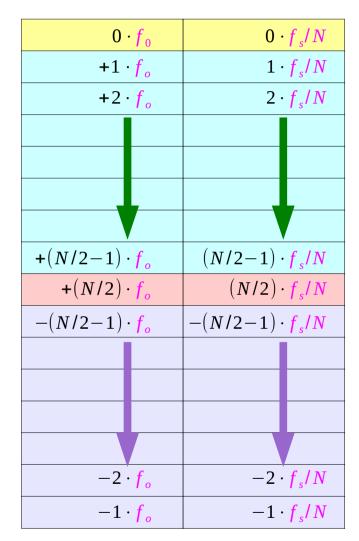
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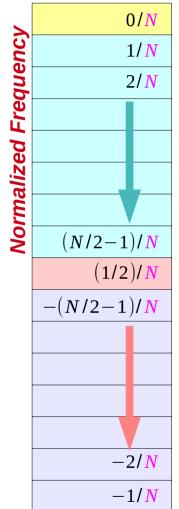
Please send corrections (or suggestions) to youngwlim@hotmail.com.

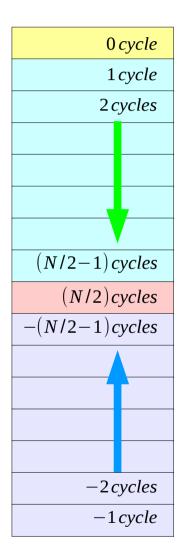
This document was produced by using LibreOffice and Octave.

Frequency View of a X[i] Vector









Resolutions of Frequency and Time Domains

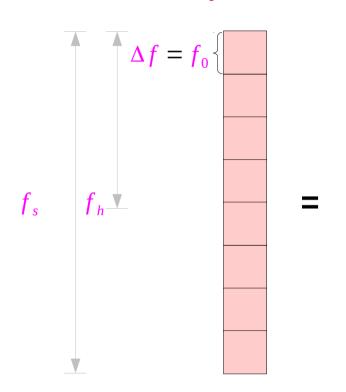
Freq Domain Time Domain Δt DF'I Watrix T_0

$$\Delta f = \frac{1}{T_0}$$

$$\Delta t = \frac{1}{f_s}$$

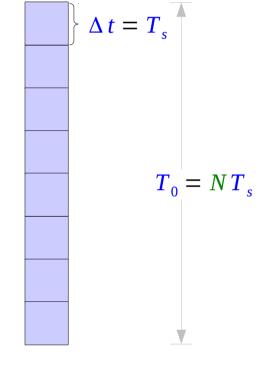
Using Sampling Frequency and Time

Freq Domain



Time Domain





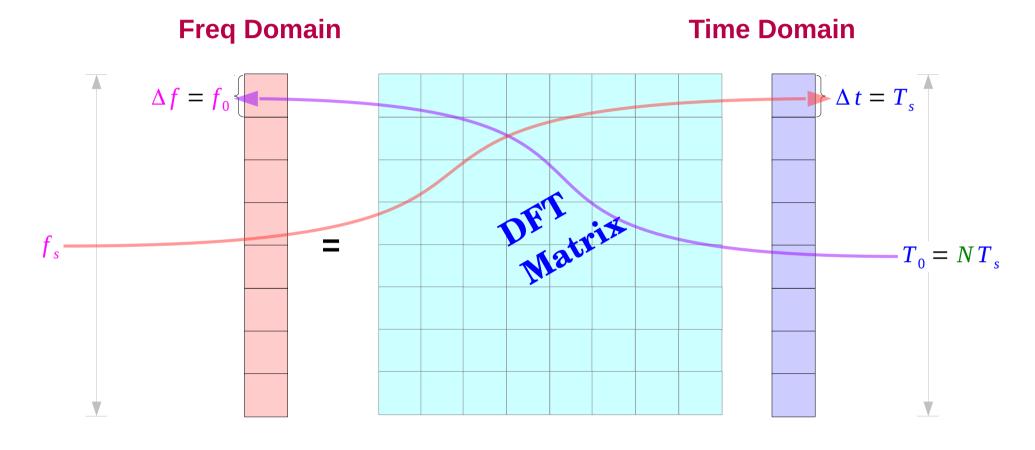
$$f_0 = \frac{1}{T_0} = \frac{1}{NT_s}$$
 $f_s \ge \frac{2}{T_0}$ $f_s \ge 2f_0$

$$f_s \ge \frac{2}{T_0}$$

$$f_s \ge 2f_0$$

$$T_s = \frac{1}{f_s}$$

Relations between Sampling Frequency and Time



$$f_0 = \frac{1}{T_0} = \frac{1}{NT_s}$$
 $f_s \ge \frac{2}{T_0}$ $f_s \ge 2f_0$

$$f_s \ge \frac{2}{T_0}$$

$$f_s \ge 2f_0$$

$$T_s = \frac{1}{f_s}$$

Frequency and Time Interval (1)

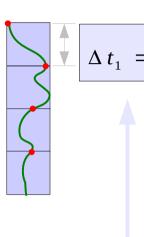
Freq Domain

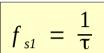
$\Delta f_1 = \frac{f_{sl}}{4} = \frac{1}{4\tau}$

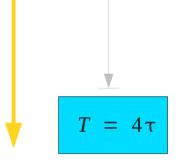


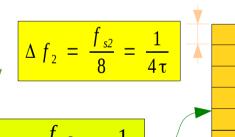
A-Pt DFT

Time Domain

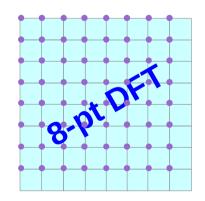


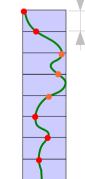


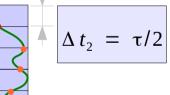




$$f_{h2} = \frac{f_{s2}}{2} = \frac{1}{\tau}$$





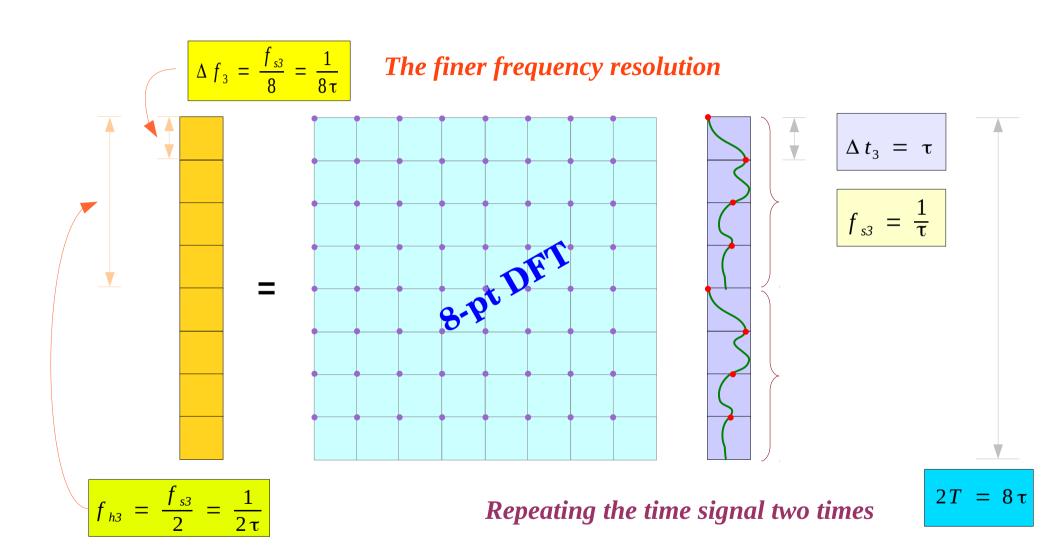


$$f_{s2} = \frac{2}{\tau}$$

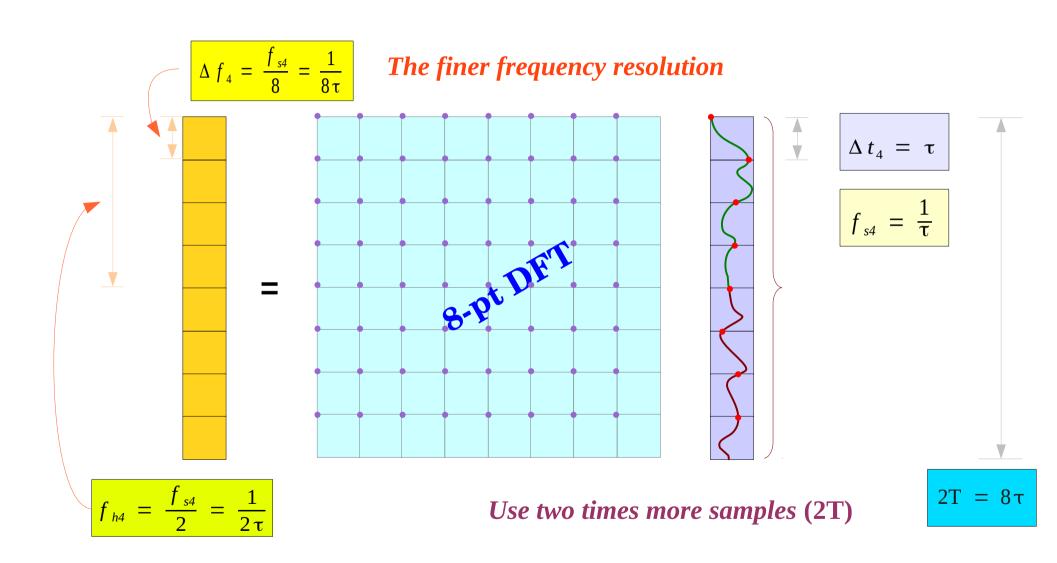
 $T = 4\tau$

The same frequency resolution

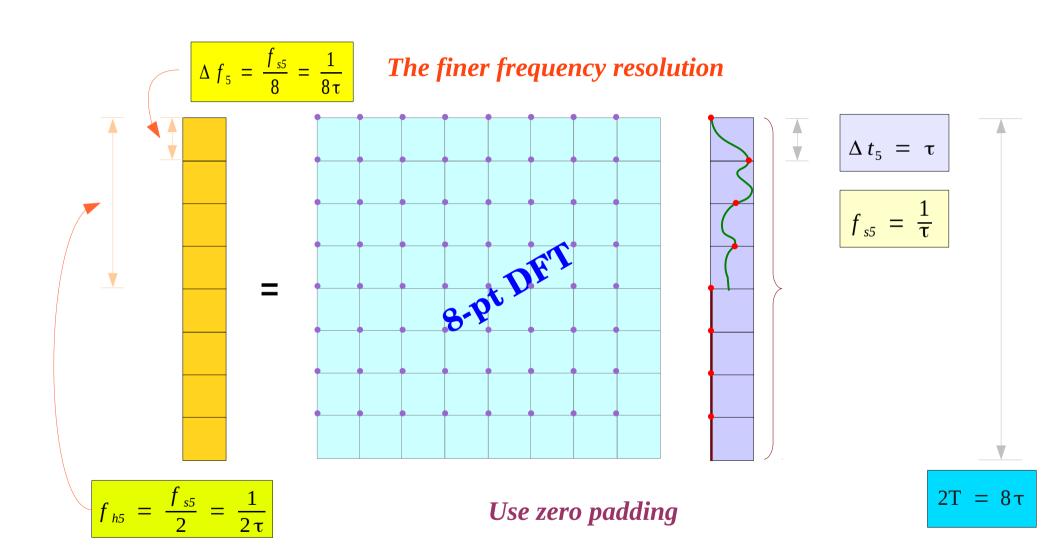
Frequency and Time Interval (2)



Frequency and Time Interval (3)



Frequency and Time Interval (4)



References

- [1] http://en.wikipedia.org/
- [2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003
- [3] A "graphical interpretation" of the DFT and FFT, by Steve Mann