- Assume N-pt. DFT of filter is computed a-priori and stored

- Compute N-pt. DFT of m-th data block

$$x_m[n] \overset{DFT}{\underset{N}{\longleftrightarrow}} X_m(k) \Rightarrow \frac{N}{2}\log_2 N \text{ cmults}$$

- Form $Y_m(k) = X_m(k)\,H_N(k) \Rightarrow N$ cmults

- Compute N-pt. inverse DFT of $Y_m(k)$

$$\Rightarrow \frac{N}{2}\log_2 N \text{ cmults}$$

Total number of complex multiplications per block:

$$2\left\{\frac{N}{2}\log_2 N\right\} + N = N\log_2(2N)$$

- The no. of good output points per block via either the overlap-add or overlap-save method is $N-(M-1)$, where M is the length of the FIR filter impulse response
- Thus, the "average" no. of complex mults. per good output point is:

$$c(N) = \frac{N \log_2(2N)}{N-(M-1)} \quad \text{vs.} \quad \begin{array}{c} M \text{ mults.} \\ \text{per output pt.} \end{array}$$

- Book example: $M=128 \Rightarrow$ find optimal power of 2 length $N = 2^\nu$

$$c(\nu) = \frac{2^\nu(\nu+1)}{2^\nu-(2^7-1)}$$

$N = 2^{10}$ $(\nu=10)$ yielded smallest value $c(10) = 12.6$