Define
\[ x_0[n] = x[2n], \quad x_2[n] = x[2n+1], \quad y[n] = x_2[n] + jx_0[n], \quad 0 \leq n \leq 0.5N - 1. \]

Then
\[ Y^d[k] = \sum_{n=0}^{0.5N-1} (x_0[n] + jx_2[n])W_N^{nk} = X_0^d[k] + jX_2^d[k], \]
\[ F^d[N-k] = \sum_{n=0}^{0.5N-1} (x_0[n] - jx_2[n])W_N^{nk} = X_0^d[k] - jX_2^d[k]. \]

Therefore,
\[ X_0^d[k] = 0.5(Y^d[k] + F^d[N-k]), \quad X_2^d[k] = -0.5(Y^d[k] - F^d[N-k]). \]

Finally, we get from the time-decimated radix-2 FFT that
\[ X^d[k] = X_0^d[k] + W_N^{-k}X_2^d[k], \quad X^d[k + 0.5N] = X_0^d[k] - W_N^{-k}X_2^d[k], \quad 0 \leq k \leq 0.5N - 1. \]

Computation of \( Y^d[k] \) requires approximately \( 0.25N (\log_2 N - 3) \) multiplications and \( 0.5N (\log_2 N - 1) \) additions. Computation of \( X_0^d[k] \) and \( X_2^d[k] \) requires \( N \) additions. The final step requires \( 0.5N \) multiplications and \( N \) additions. The total is \( 0.25N (\log_2 N - 1) \) complex multiplications and additions.