

## A. ALGORITHMS FOR SMALL DHTs

### 1) A DHT Algorithm for $N=4$

For a small DHT of length  $N=4$  we have:

$$X(0) = [x(0) + x(2)] + [x(1) + x(3)]$$

$$X(1) = [x(0) - x(2)] + [x(1) - x(3)]$$

$$X(2) = [x(0) + x(2)] - [x(1) + x(3)]$$

$$X(3) = [x(0) - x(2)] - [x(1) - x(3)]$$

### 2) A DHT Algorithm for $N=8$

For DHT of length  $N=8$  we have:

$$X(0) = [(x(0) + x(2)) + (x(4) + x(6))] + \\ + [(x(1) + x(3)) + (x(5) + x(7))]$$

$$X(2) = [(x(0) - x(2)) + (x(4) - x(6))] + \\ + [(x(1) - x(3)) + (x(5) - x(7))]$$

$$X(4) = [(x(0) + x(2)) + (x(4) + x(6))] - \\ - [(x(1) + x(3)) + (x(5) + x(7))]$$

$$X(6) = [(x(0) - x(2)) + (x(4) - x(6))] - \\ - [(x(1) + x(5)) - (x(3) + x(7))]$$

$$X(1) = [x(0) + x(2)] - [x(4) + x(6)] + c[x(1) - x(5)]$$

$$X(3) = [x(0) - x(2)] - [x(4) - x(6)] + c[x(3) - x(7)]$$

$$X(5) = [x(0) + x(2)] - [x(4) + x(6)] - c[x(1) - x(5)]$$

$$X(7) = [x(0) - x(2)] - [x(4) - x(6)] - c[x(3) - x(7)]$$

with:  $c = \sqrt{2}$

We have  $M_{DHT(8)} = 2$   $A_{DHT(8)} = 16$  as defined below.