

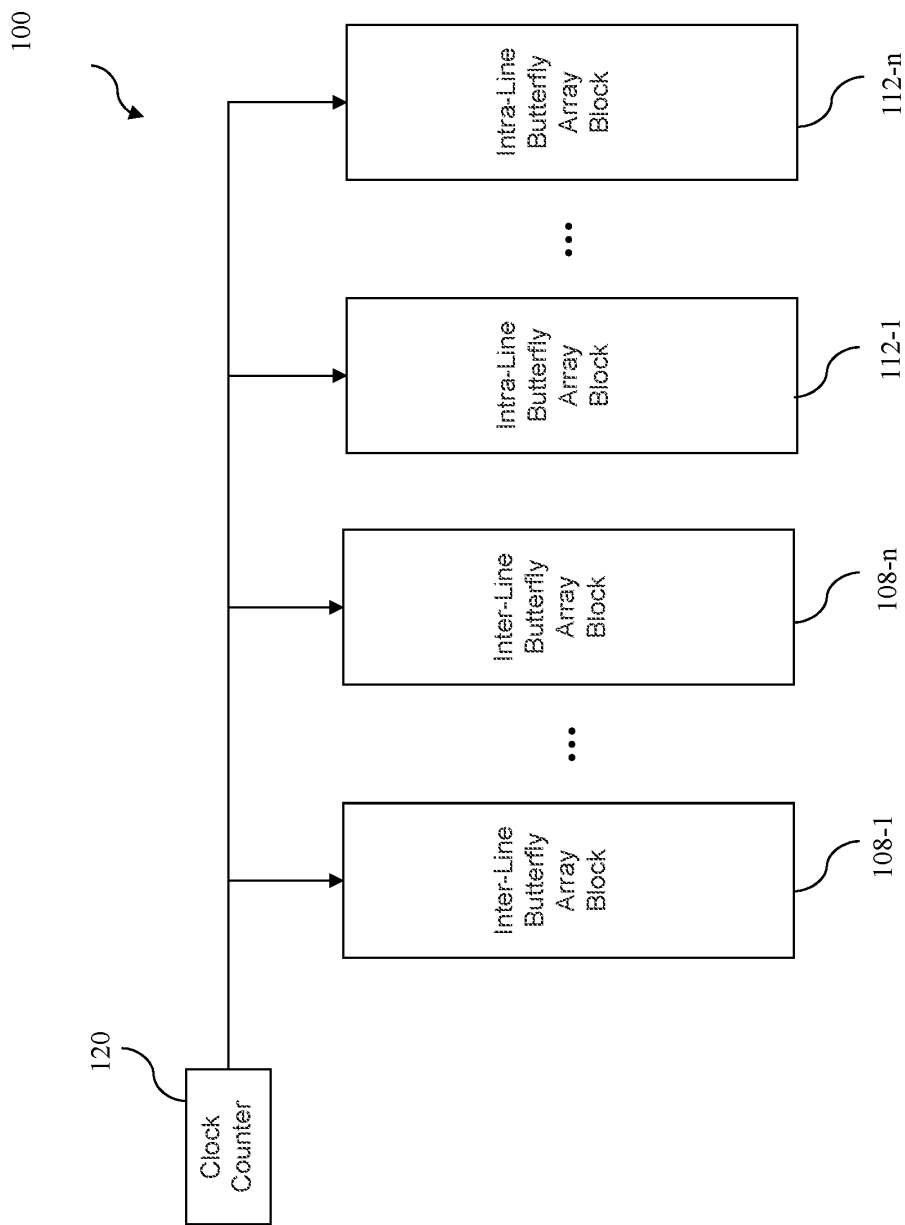


FIG. 1

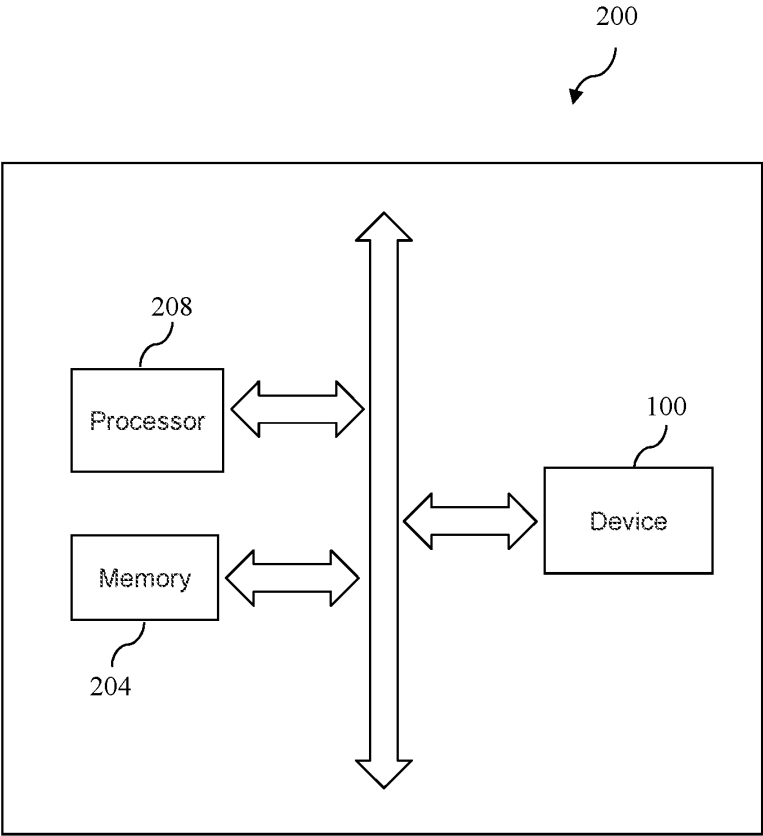


FIG. 2

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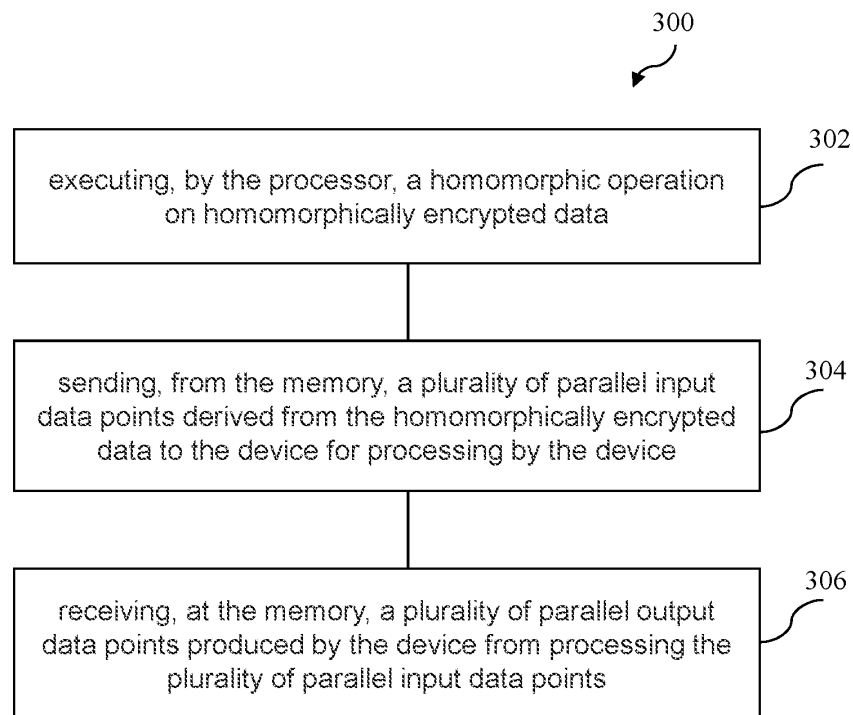


FIG. 3

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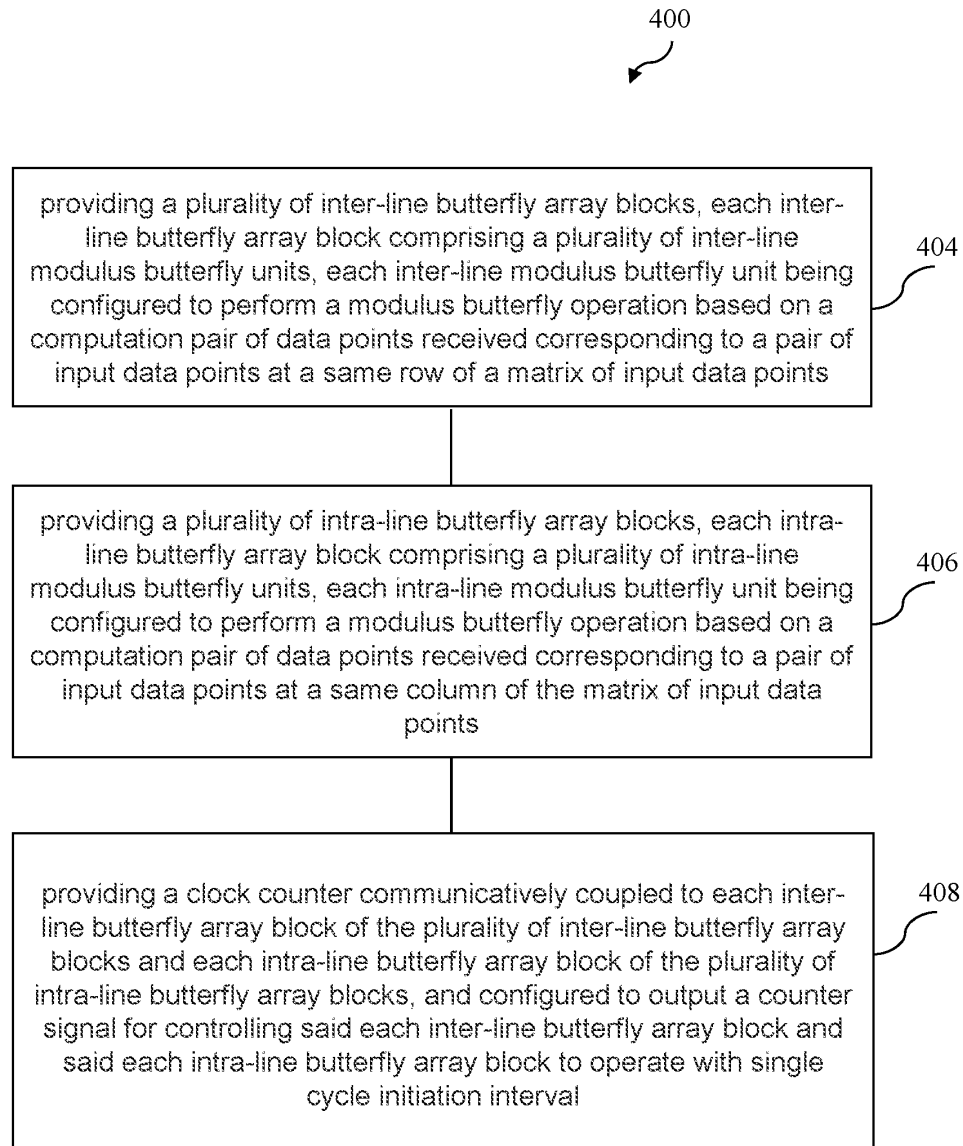


FIG. 4

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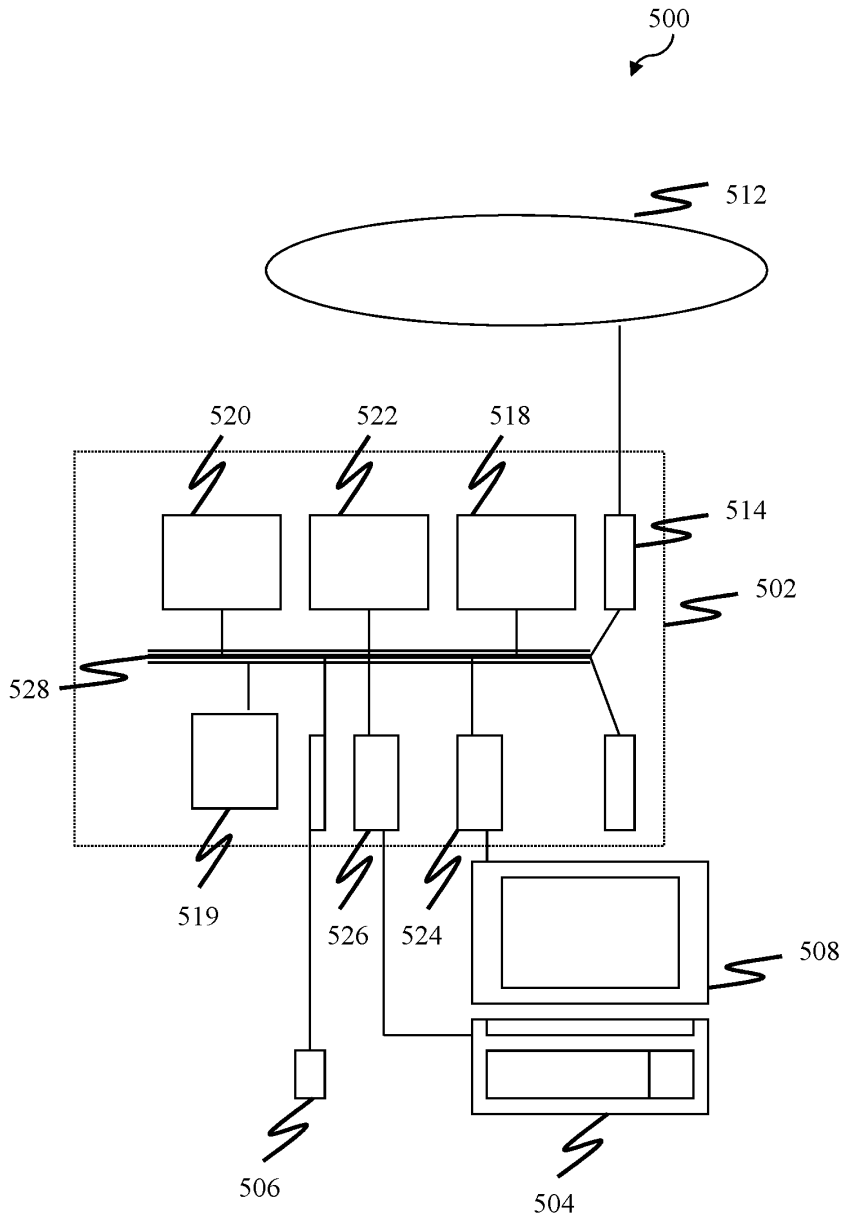


FIG. 5

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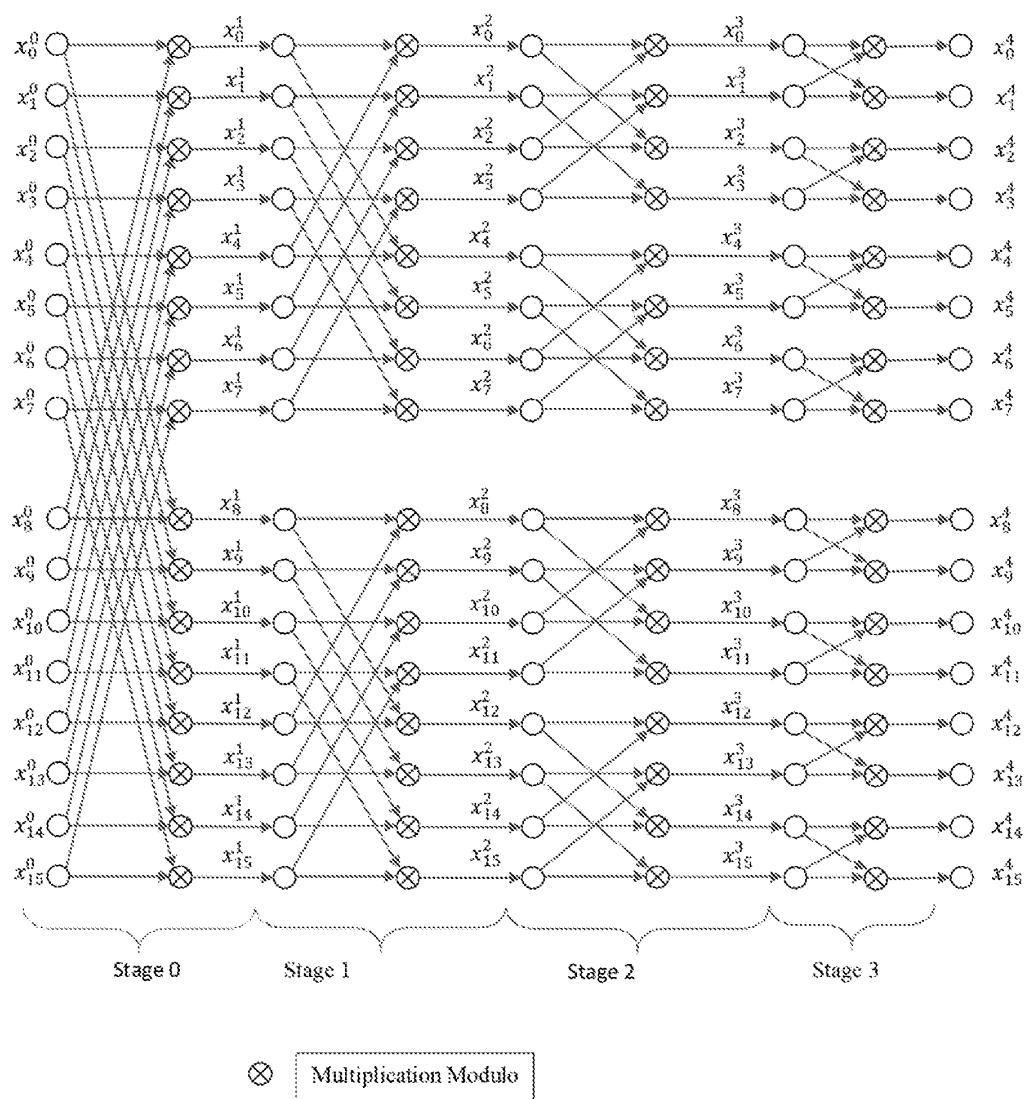


FIG. 6

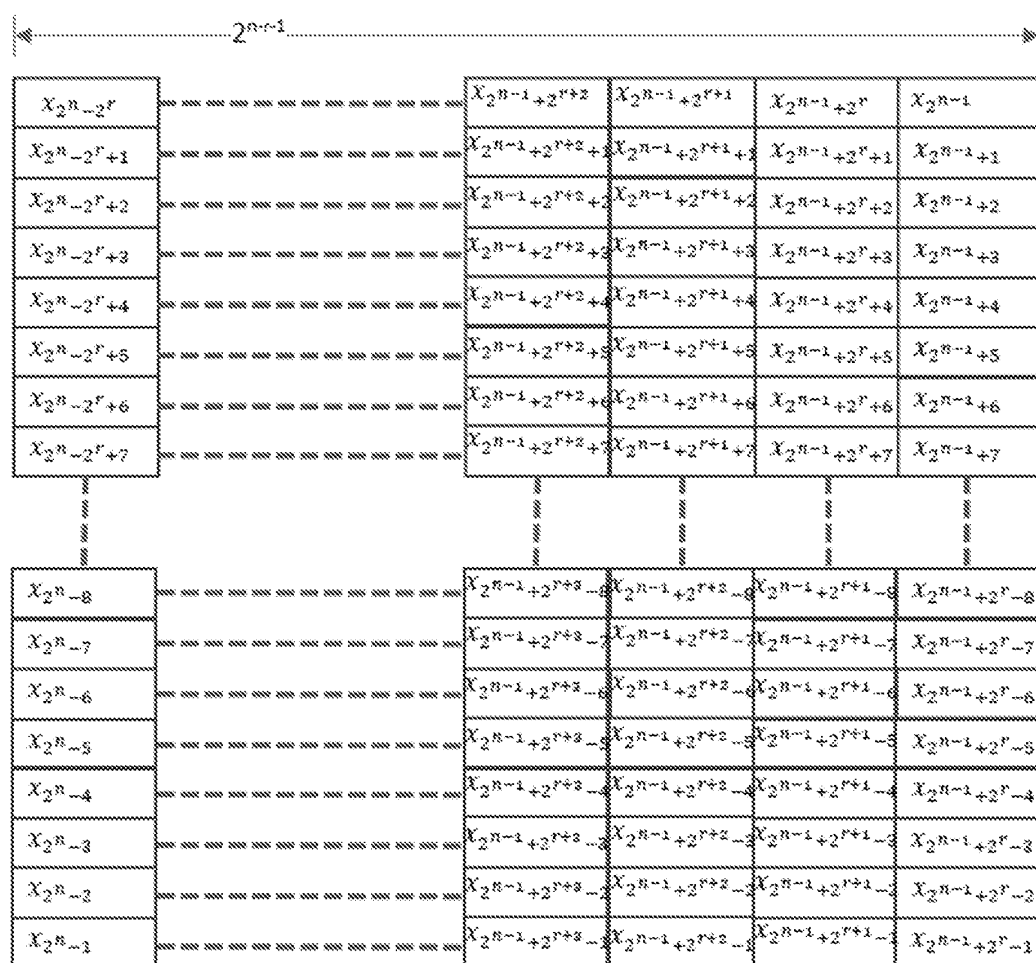
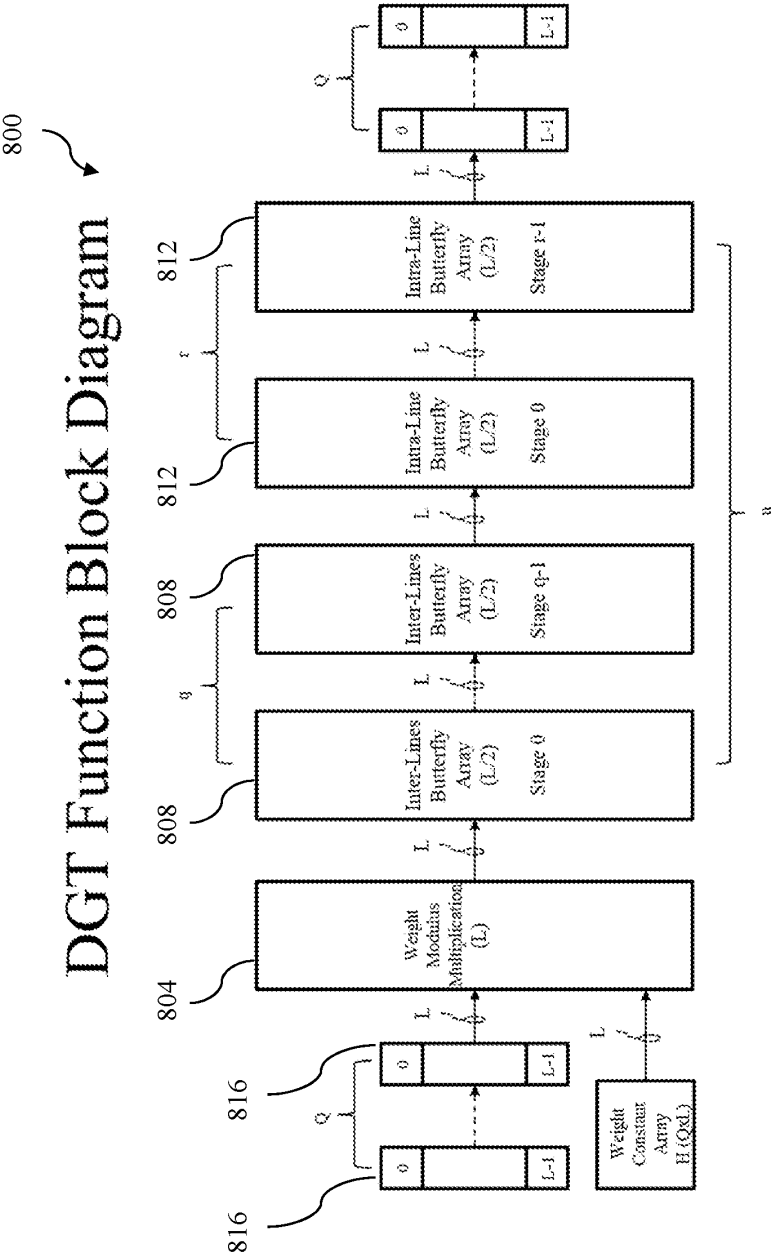


FIG. 7A



FIG. 7B



$$m=2^{15}, m=L*Q, m=2^n, L=2^r, Q=2^q, n=q+r$$

H: array with Q x L constant complex integers.

FIG. 8

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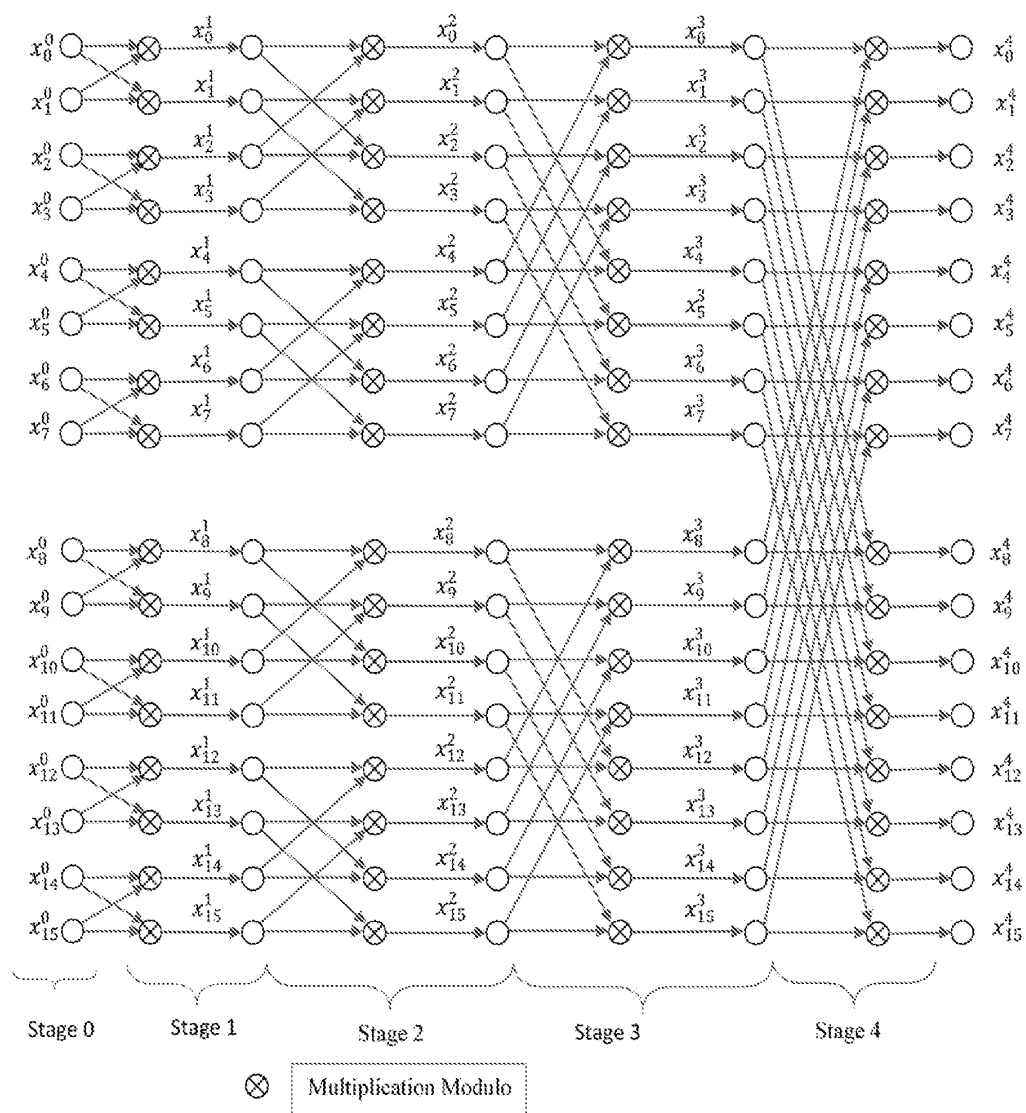
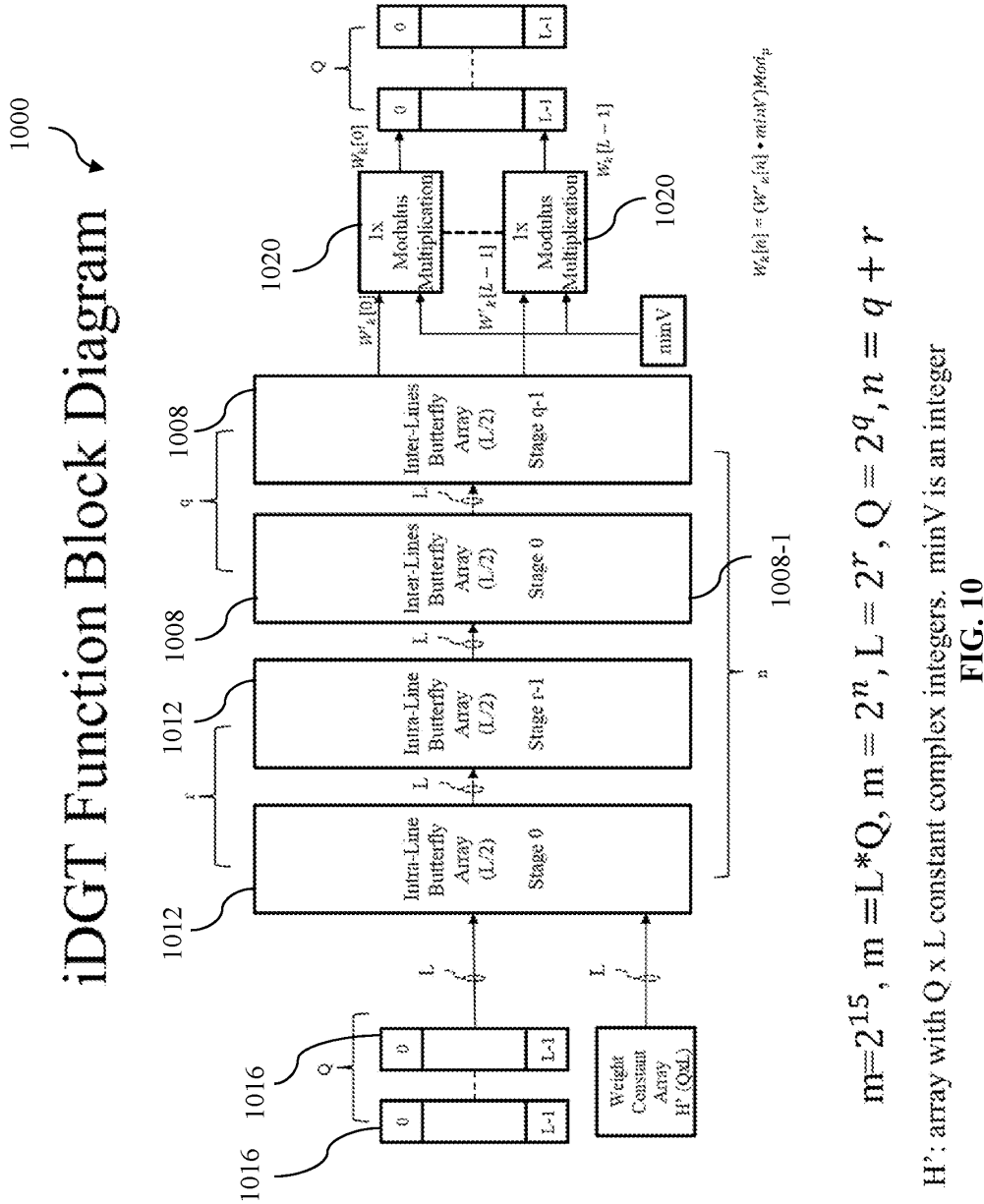
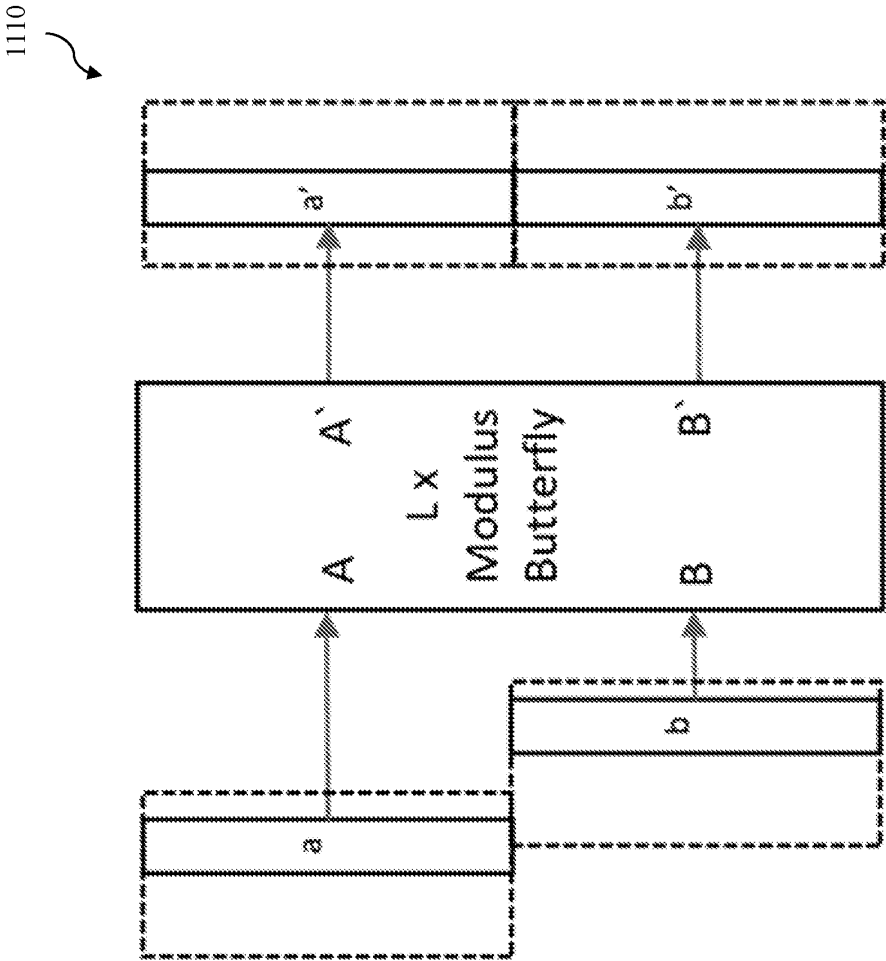


FIG. 9





Two-buffer pipeline  
FIG. 11A

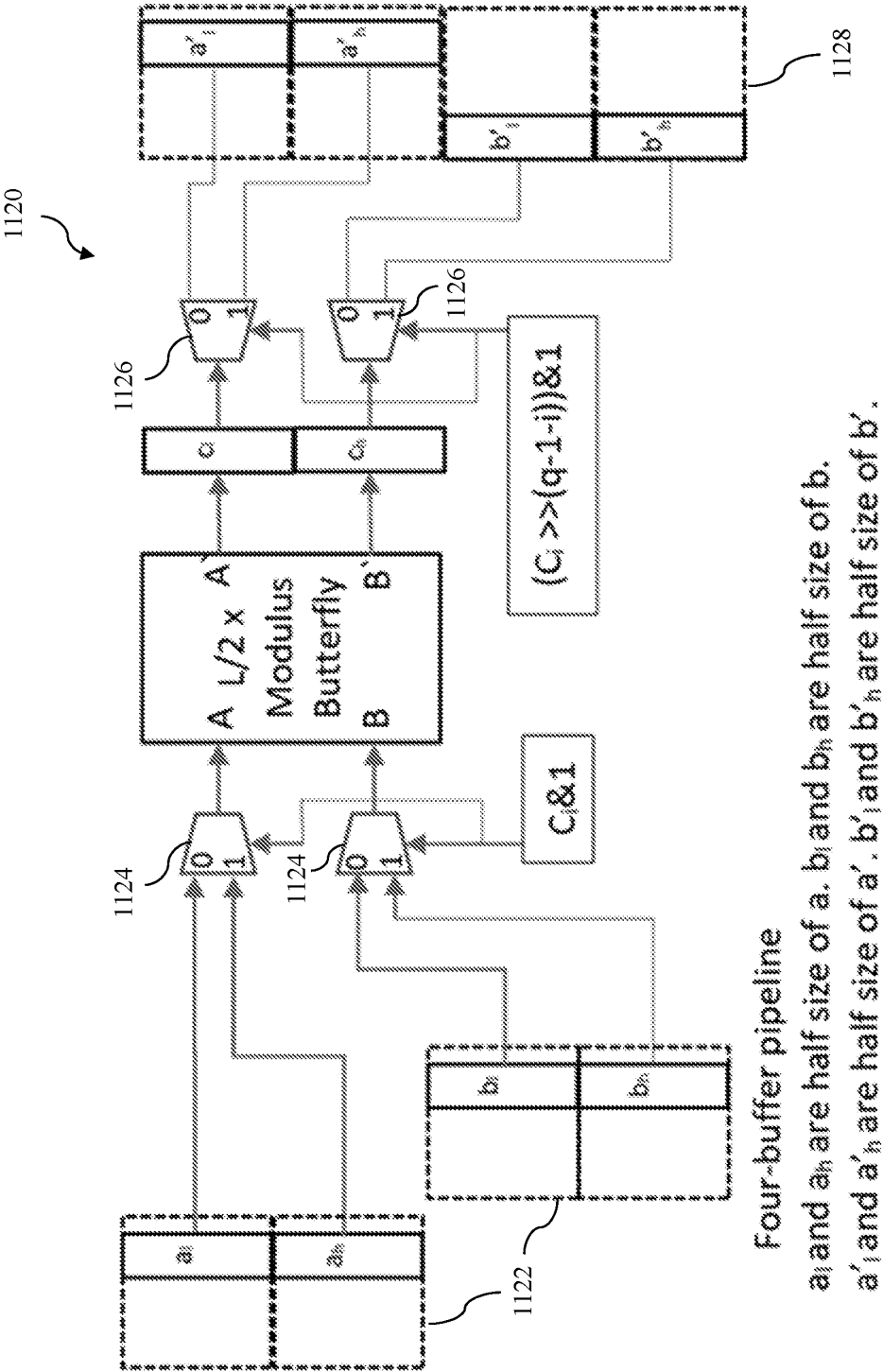


FIG. 11B

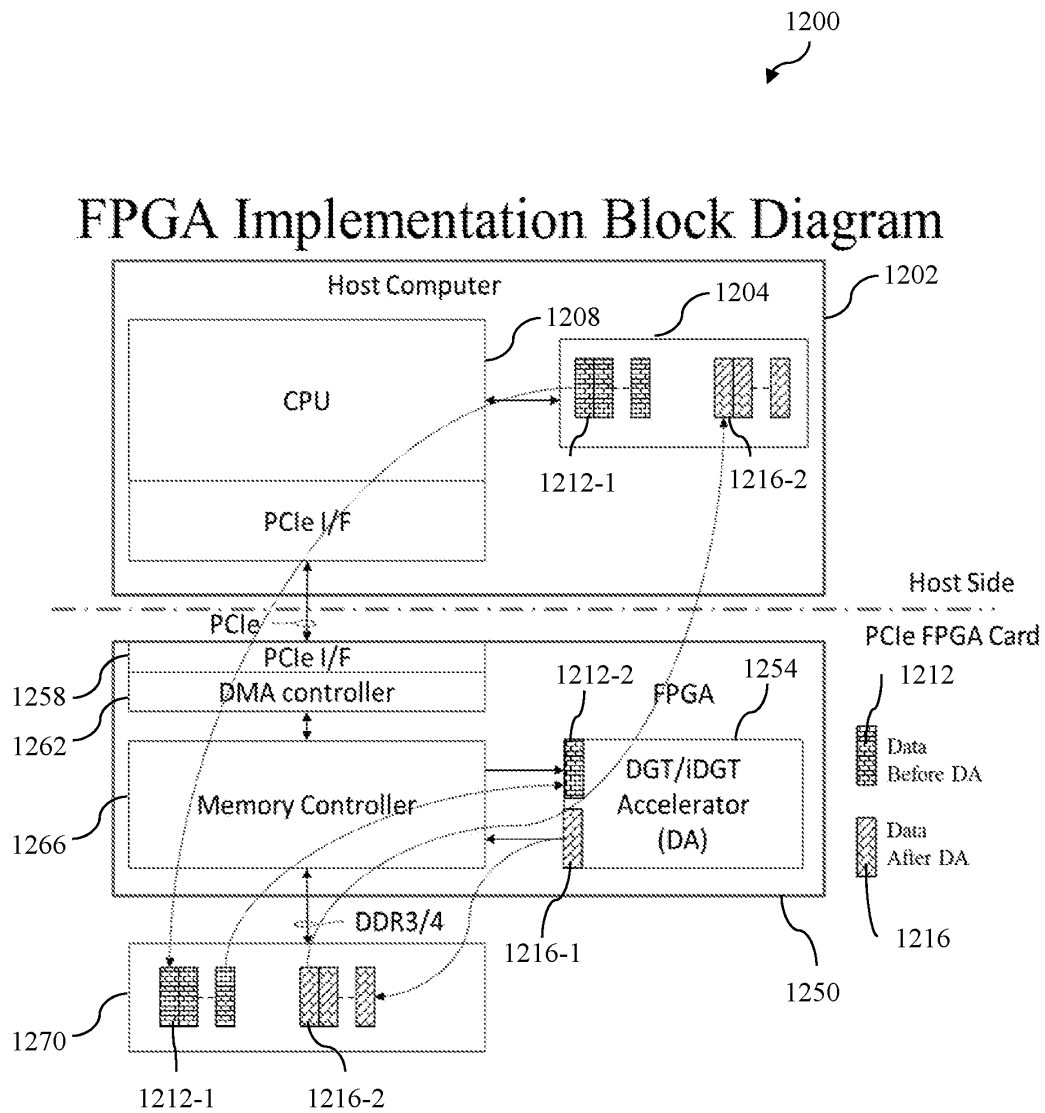


FIG. 12

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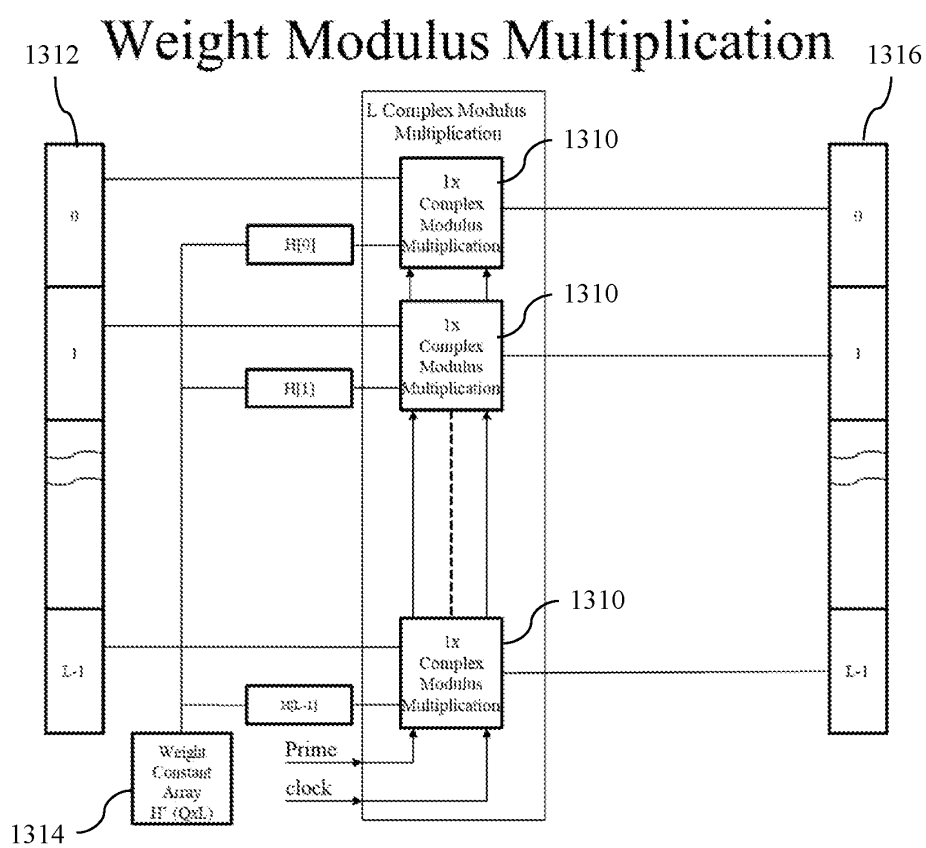


FIG. 13

## Complex Modulus Multiplication

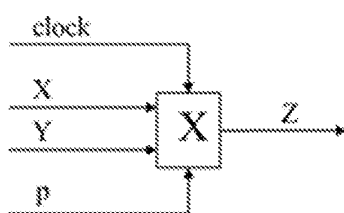


FIG. 14

808-0

### Inter-lines Butterfly Array Stage 0

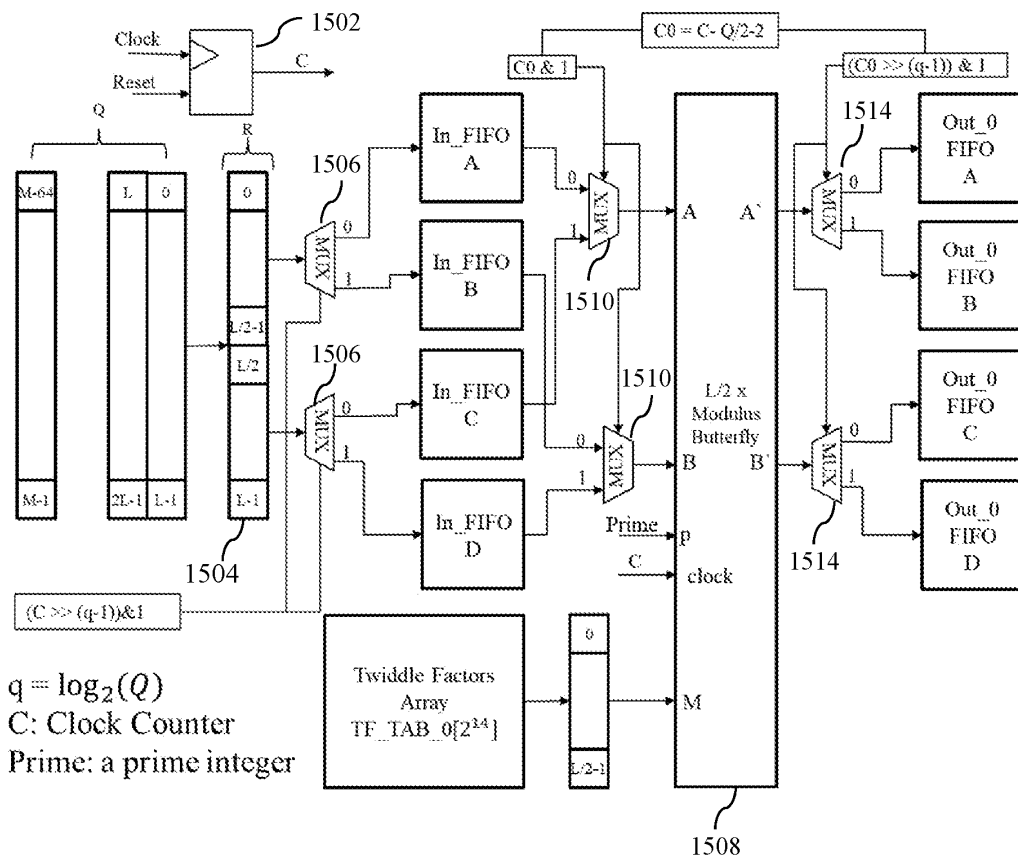


FIG. 15

1508

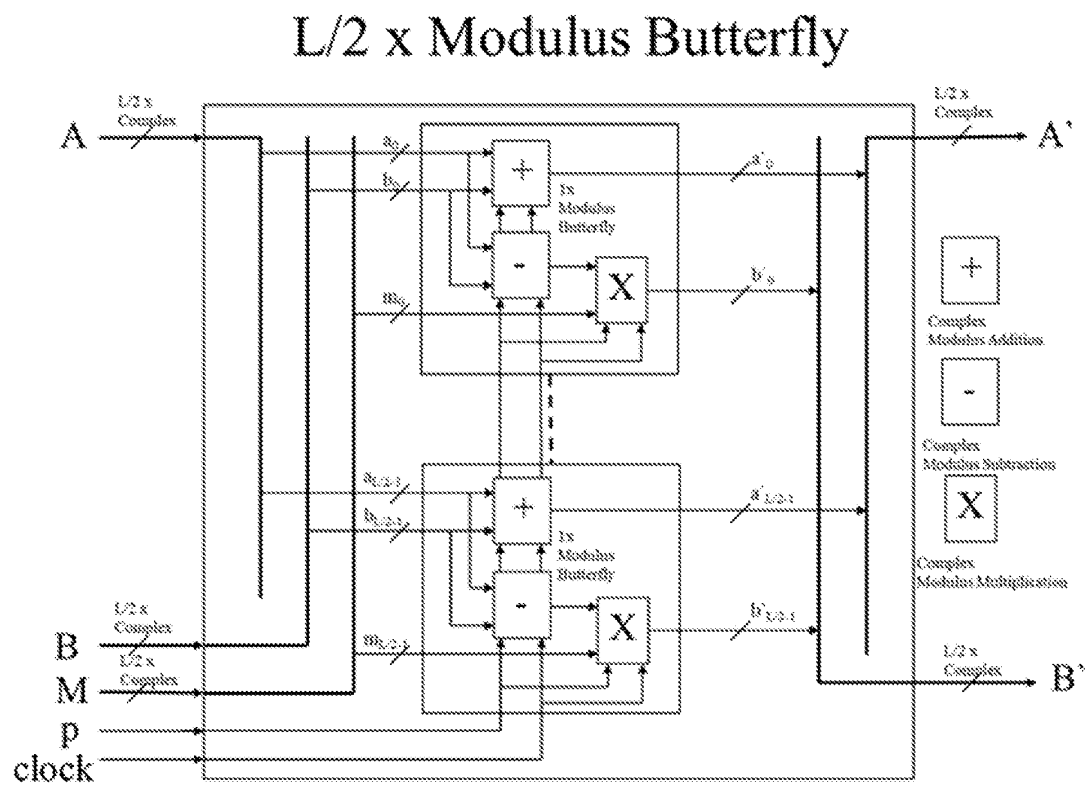


FIG. 16

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## Complex Modulus Addition

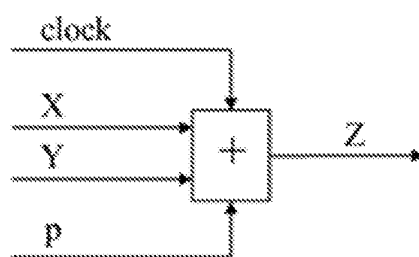


FIG. 17

## Complex Modulus Subtraction

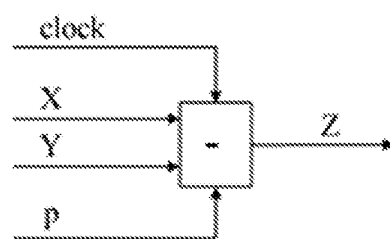


FIG. 18

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808-i

# Inter-lines Butterfly Array Stage i (1 to q-2)

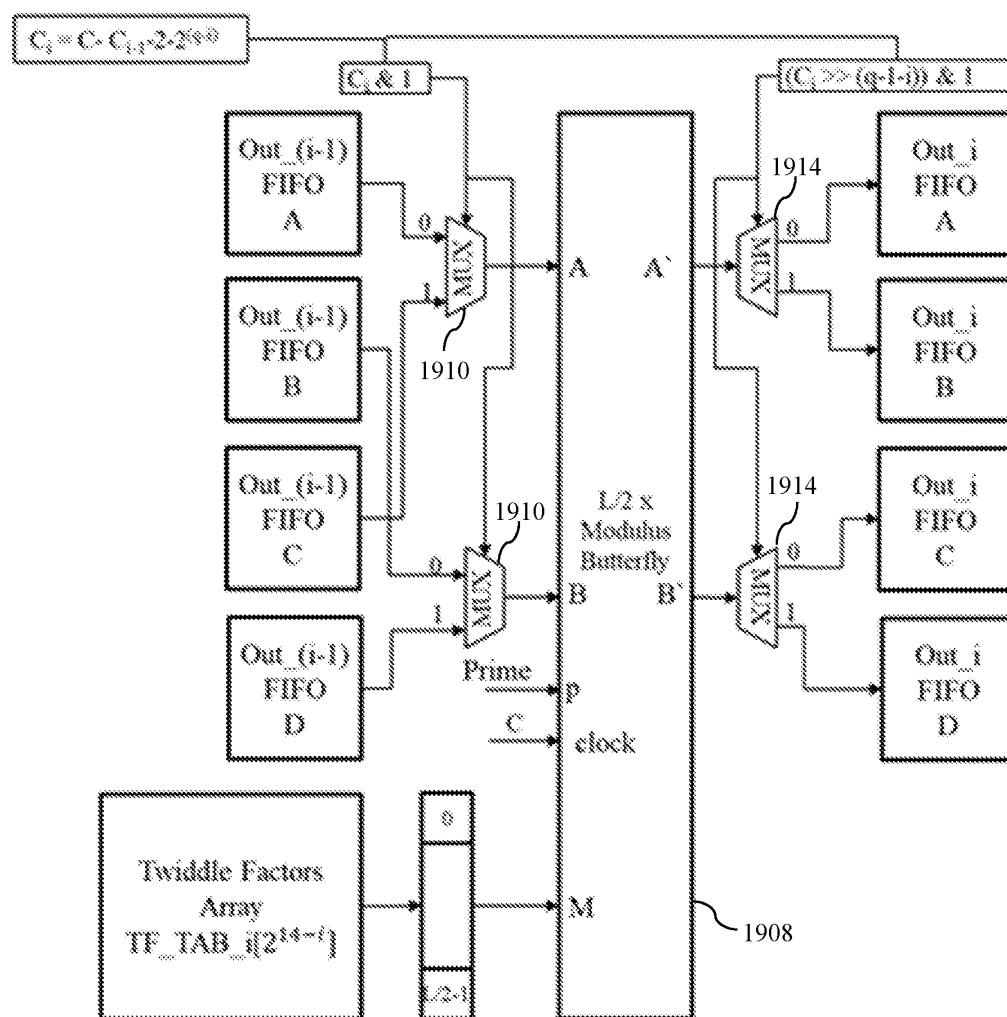


FIG. 19

808-n

## Inter-lines Butterfly Array Stage q-1

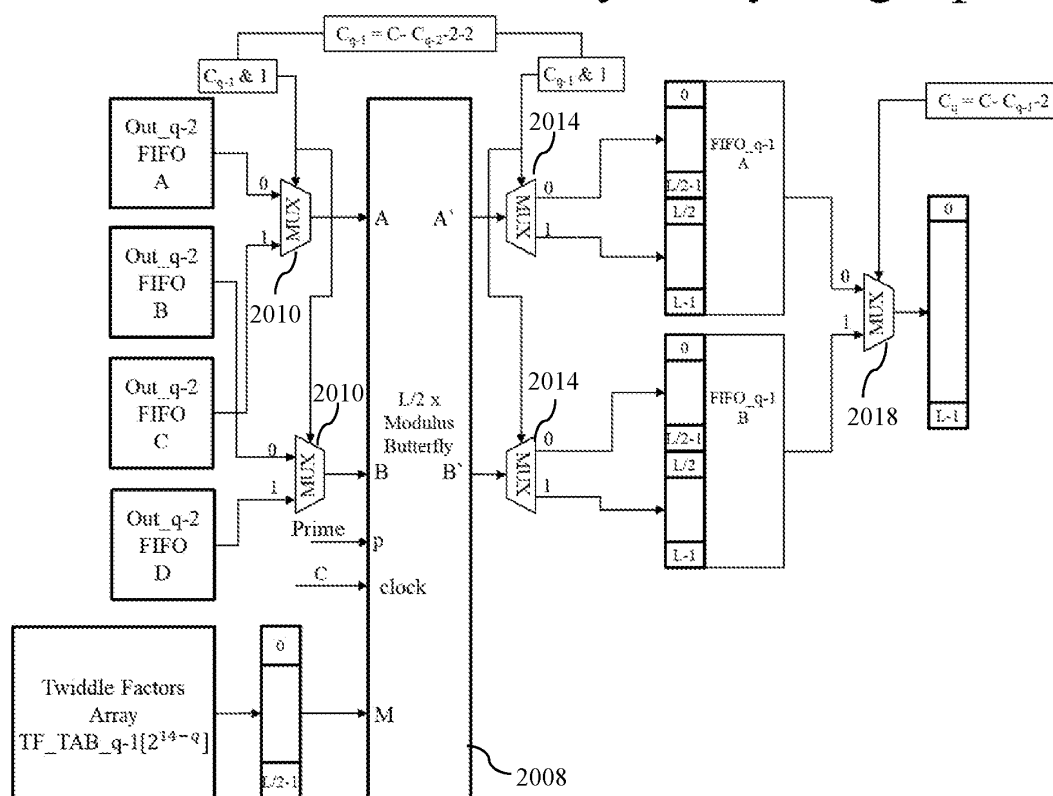


FIG. 20

812-0

### Intra-line Butterfly Array Stage 0

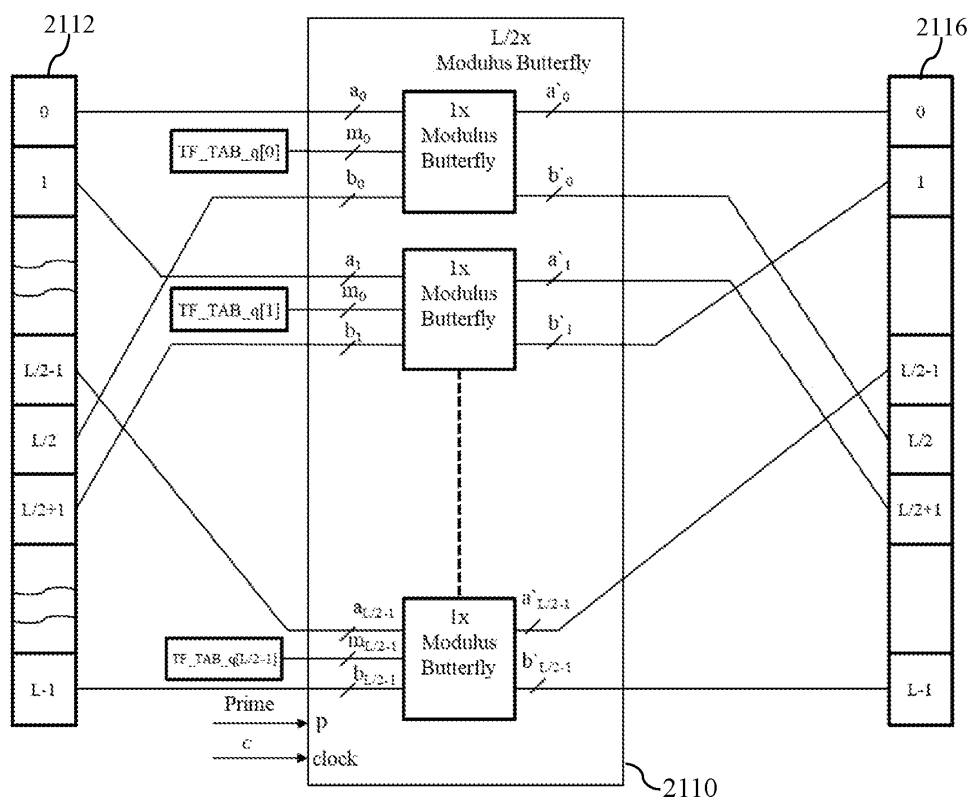


FIG. 21

812-j

### Intra-line Butterfly Array Stage $j$ (1 to $r-1$ )

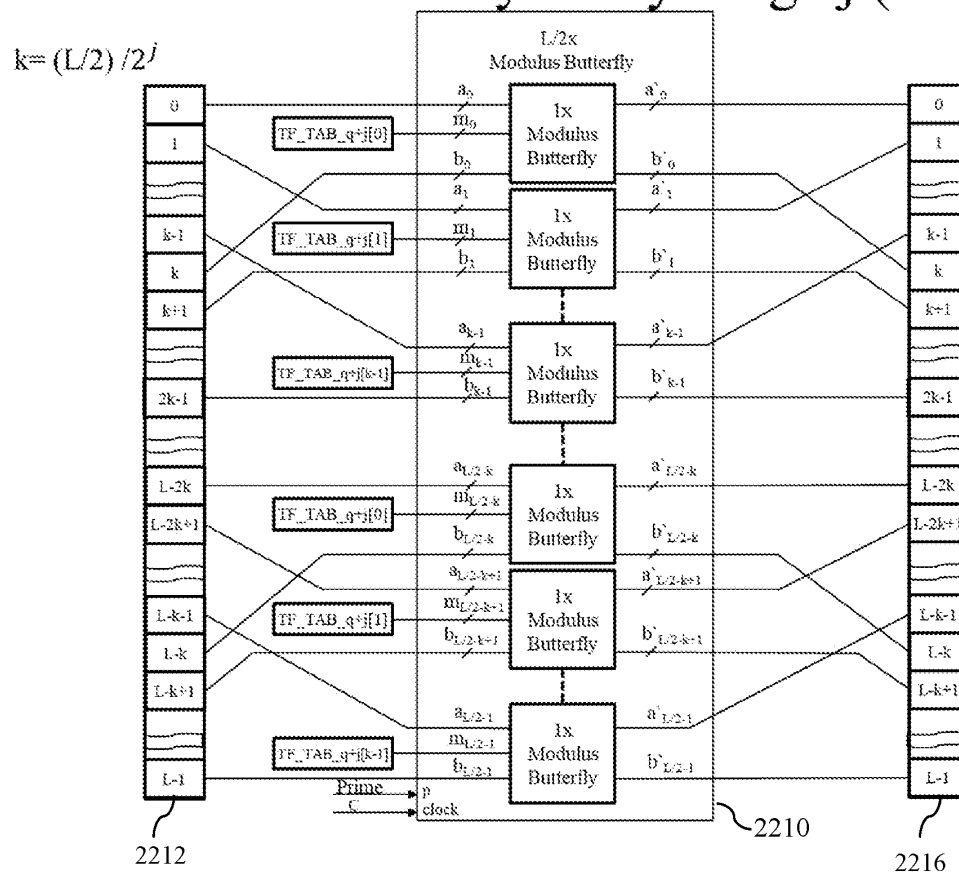


FIG. 22

1012-0

# Intra-line Reverse Butterfly Array Stage 0

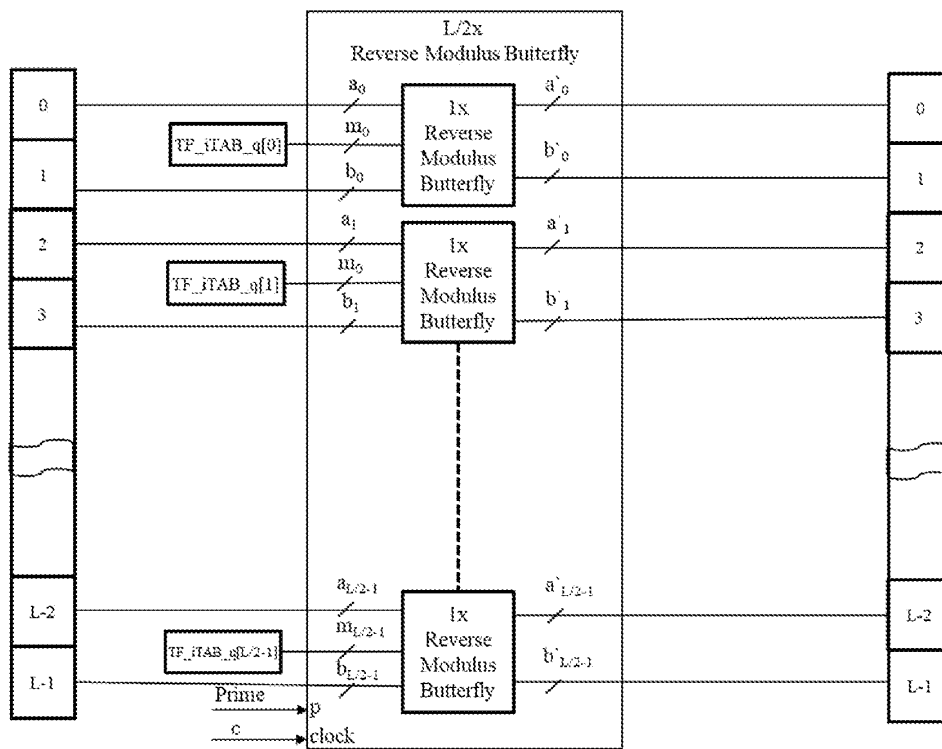


FIG. 23

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1012-j

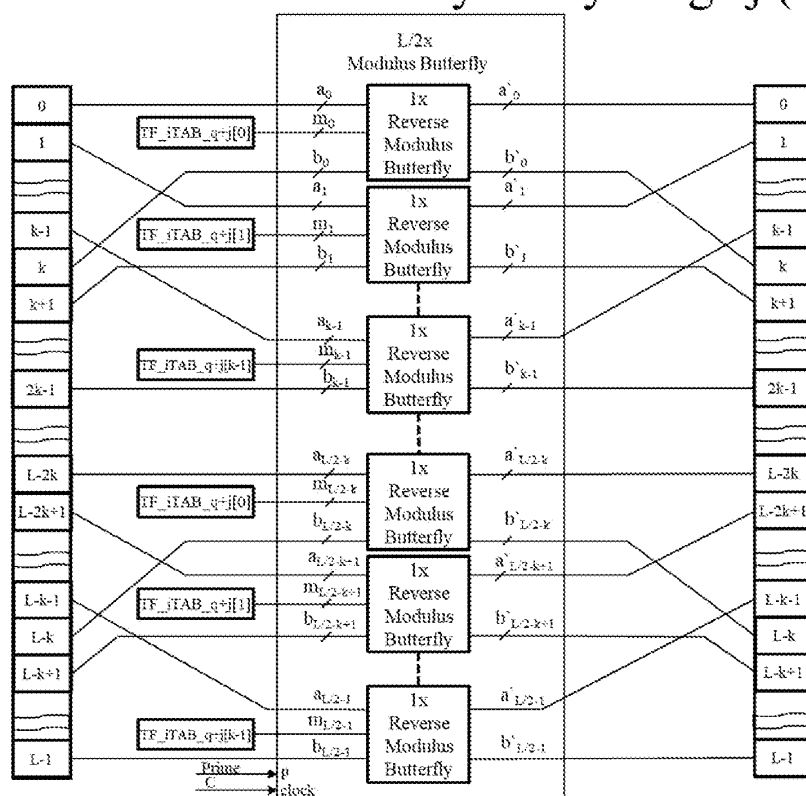
Intra-line Reverse Butterfly Array Stage  $j$  (1 to  $r-1$ ) $k = 2^j$ 

FIG. 24

1008-0

## Inter-lines Reverse Butterfly Array Stage 0

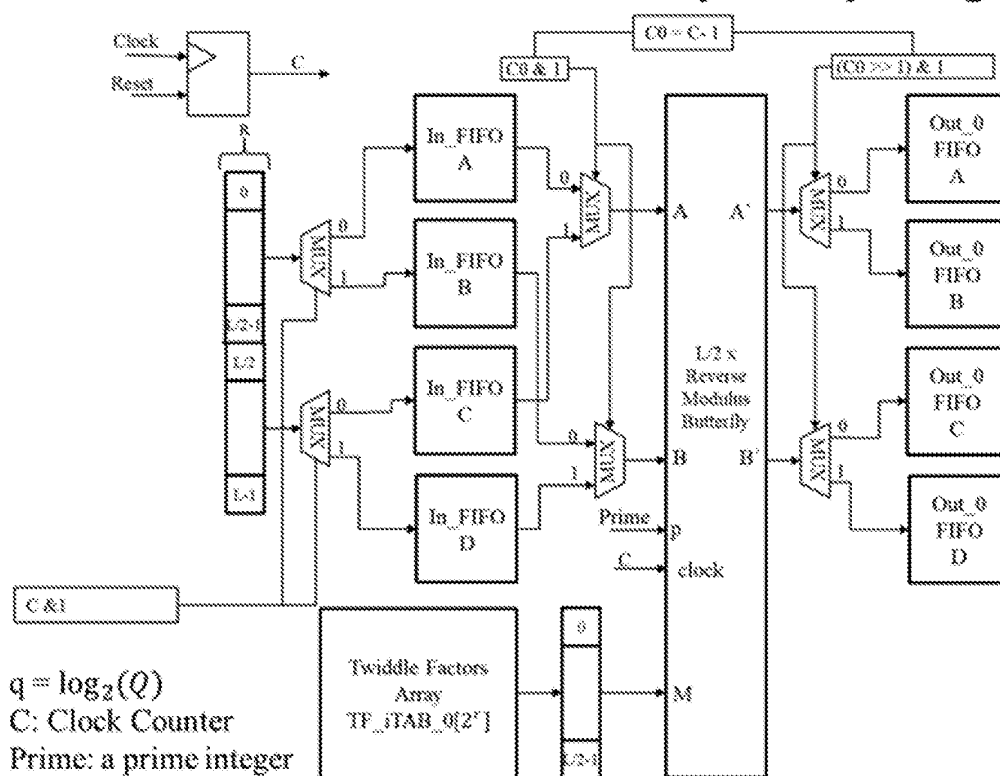


FIG. 25

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1008-i

## Inter-lines Reverse Butterfly Array Stage i (1 to q-2)

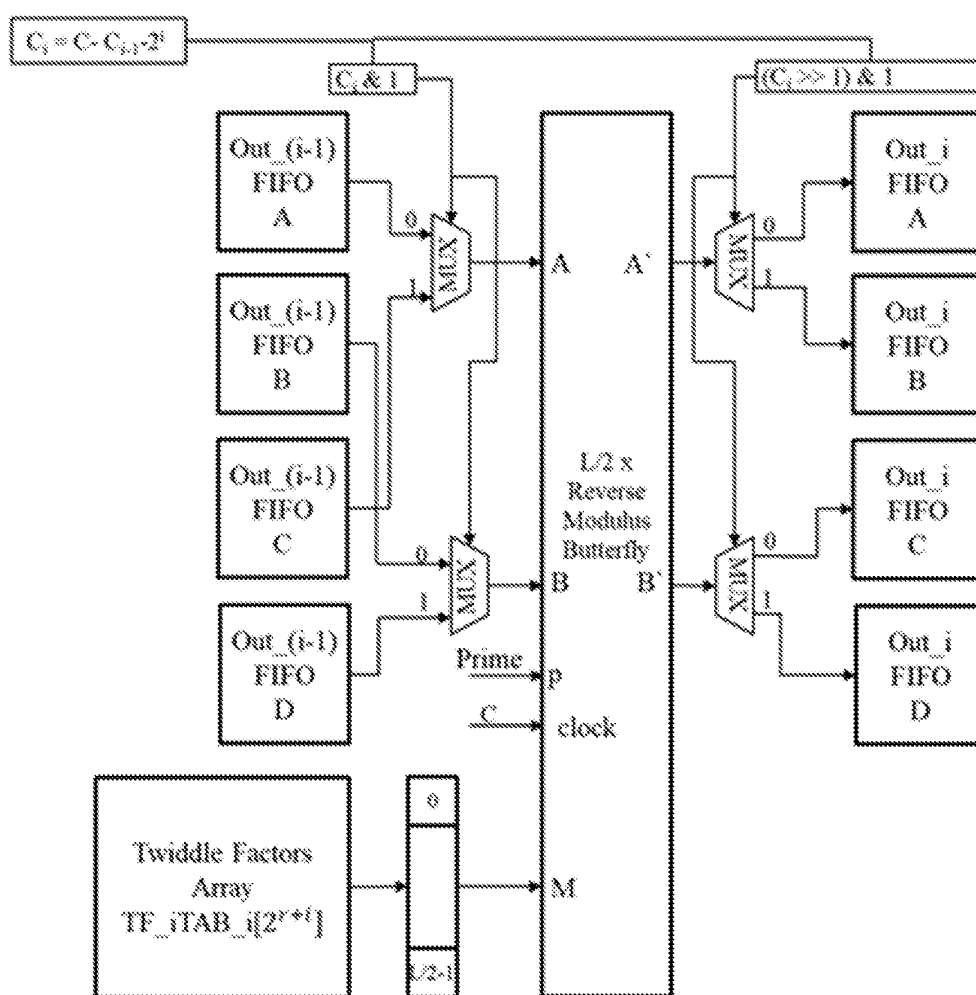


FIG. 26

1008-n

# Inter-lines Reverse Butterfly Array Stage q-1

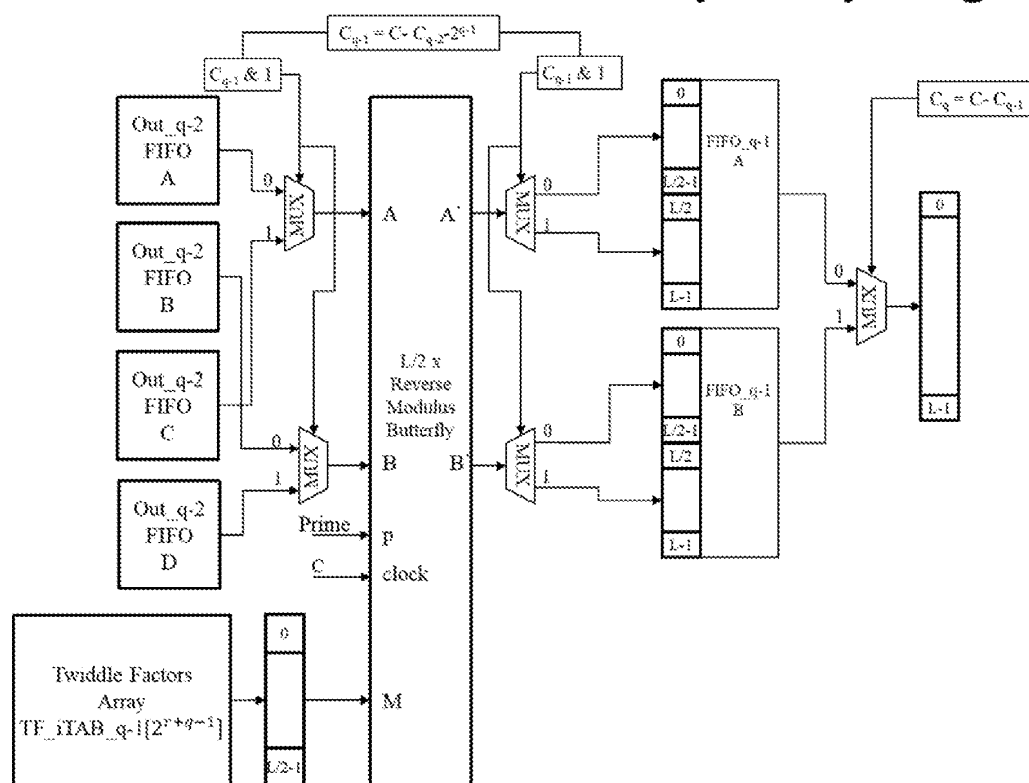


FIG. 27

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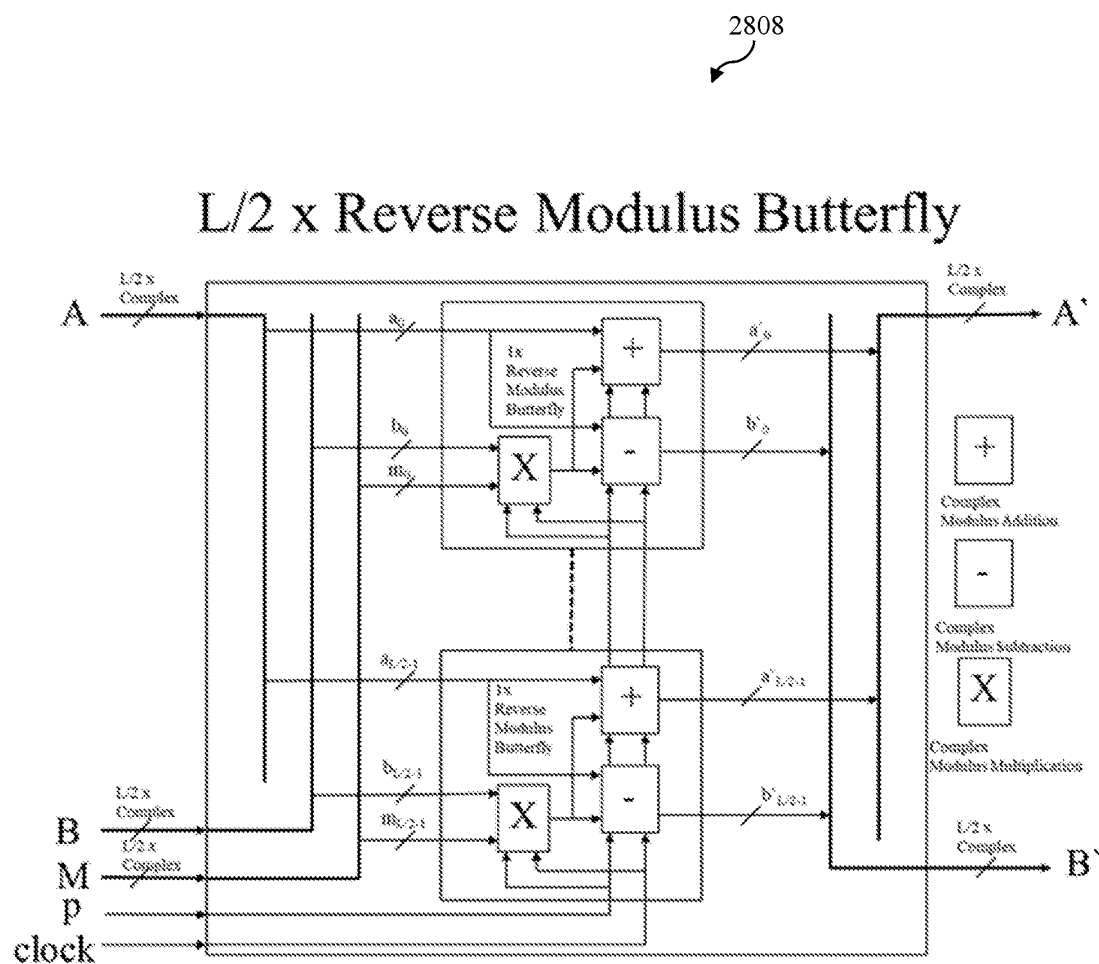


FIG. 28

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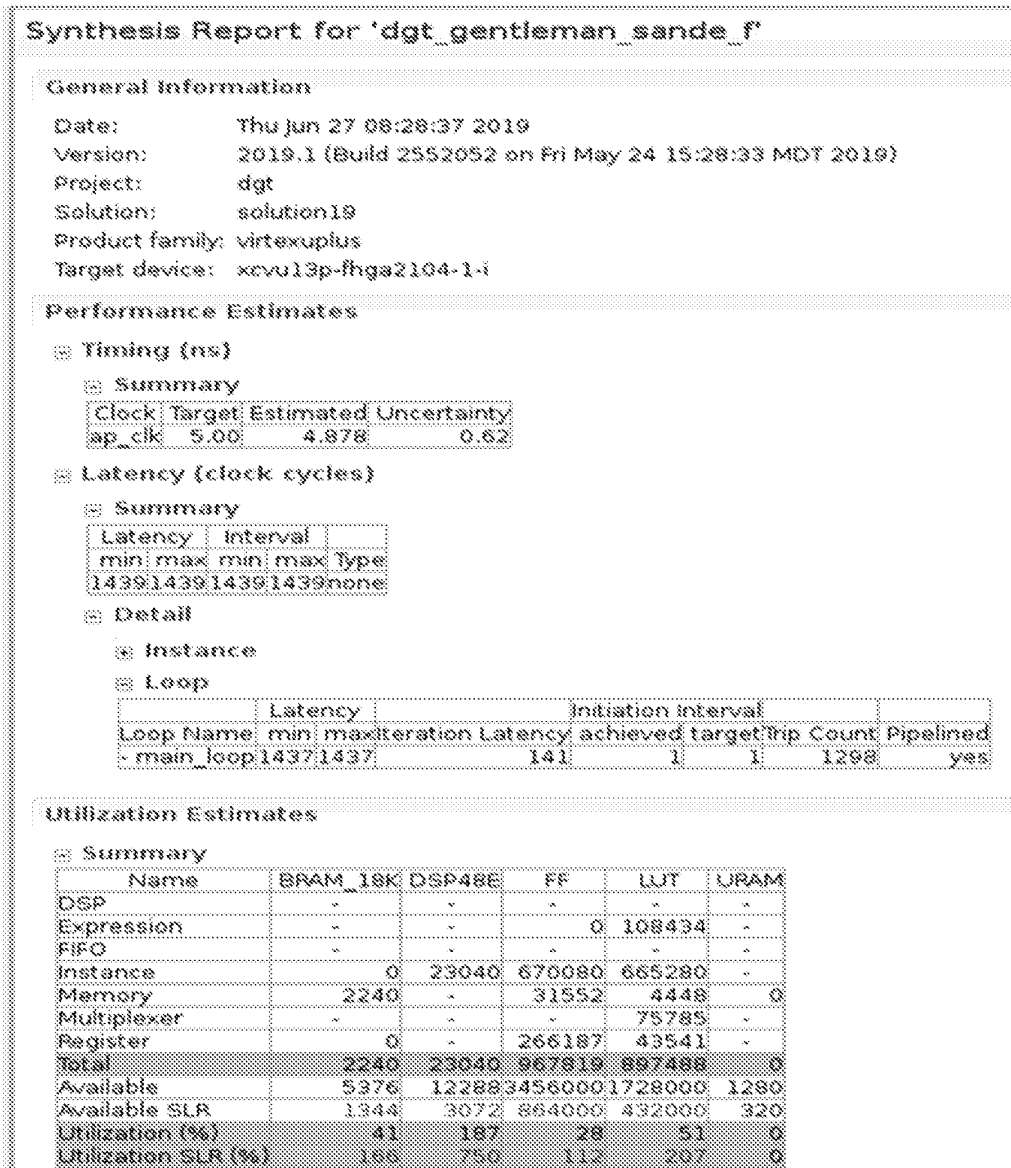


FIG. 29

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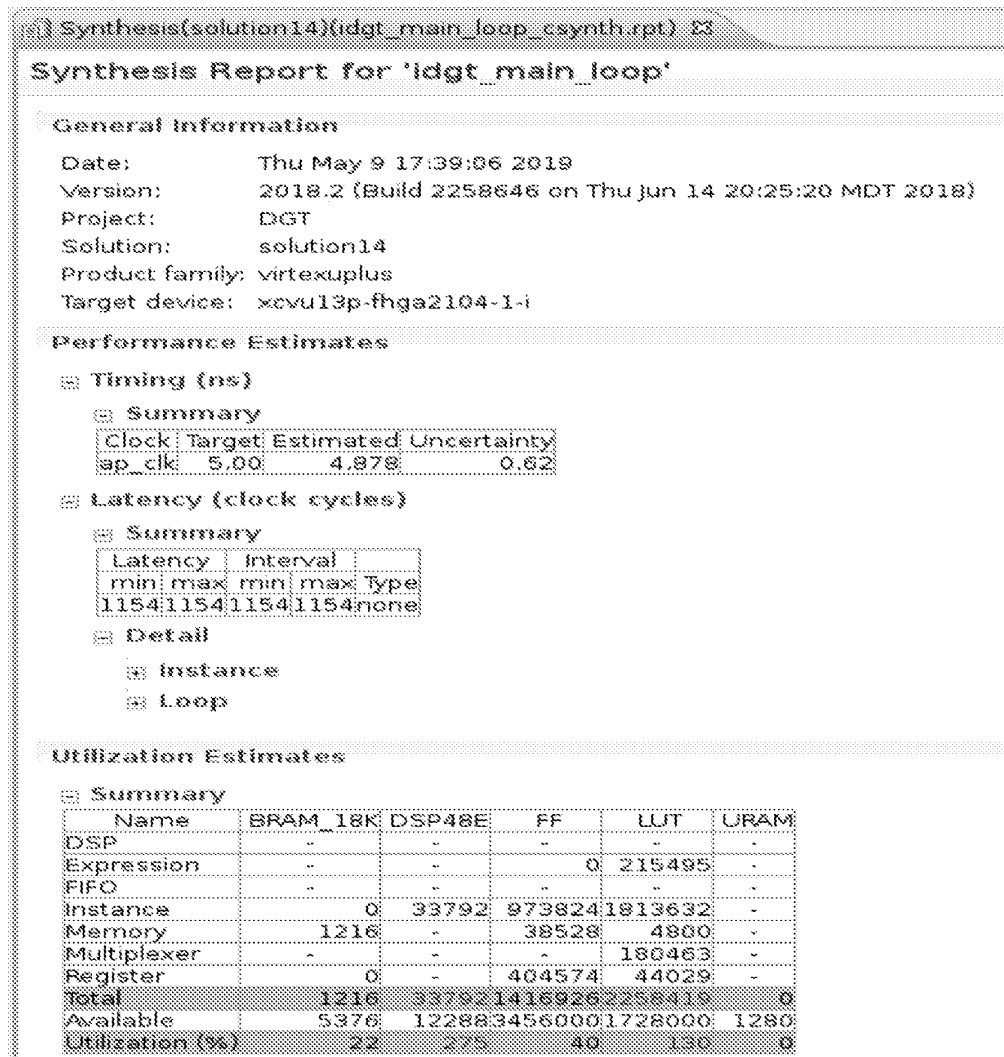
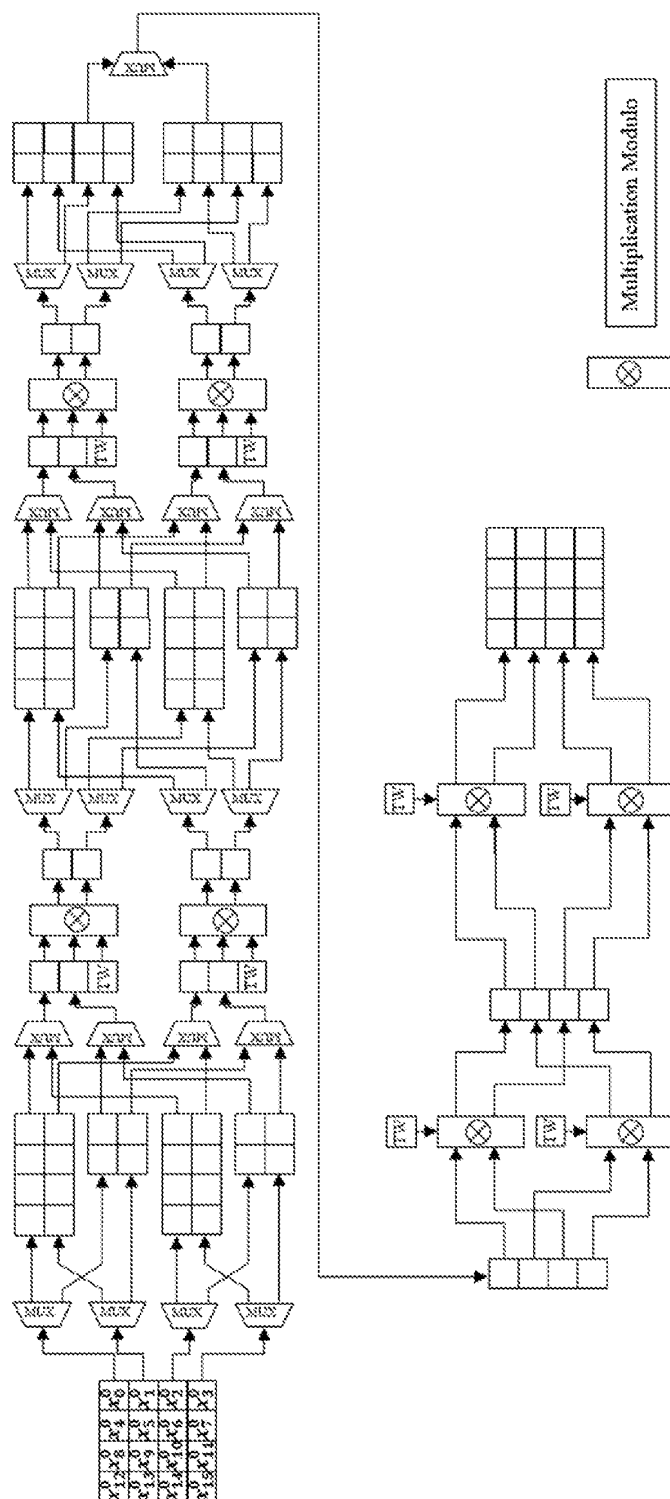


FIG. 30



**FIG. 31A**

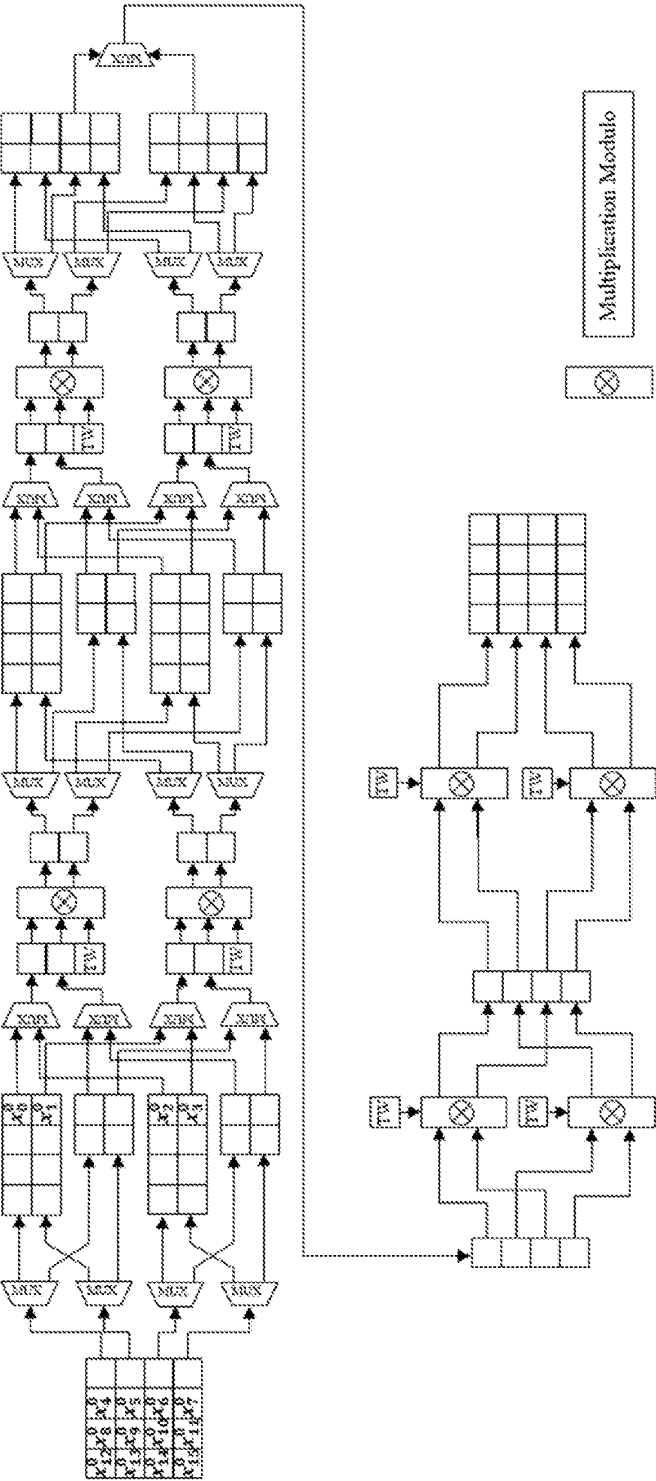


FIG. 31B

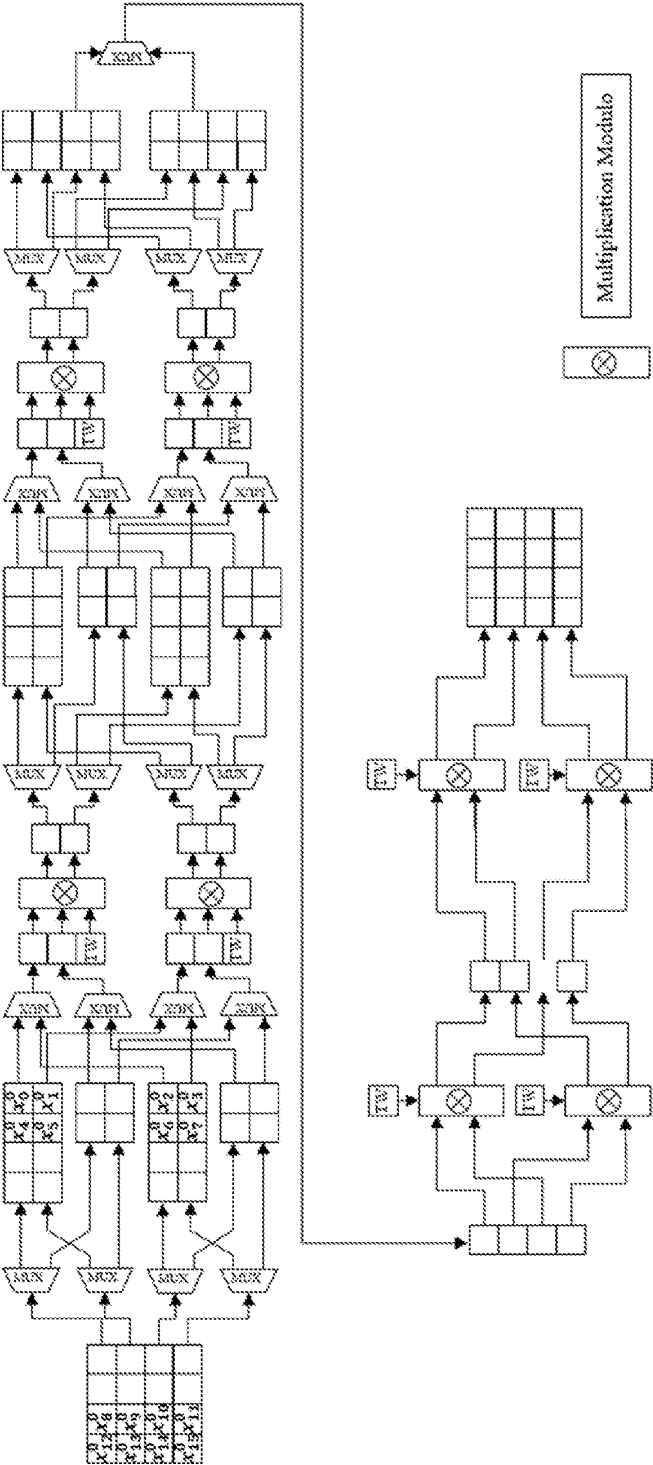


FIG. 31C

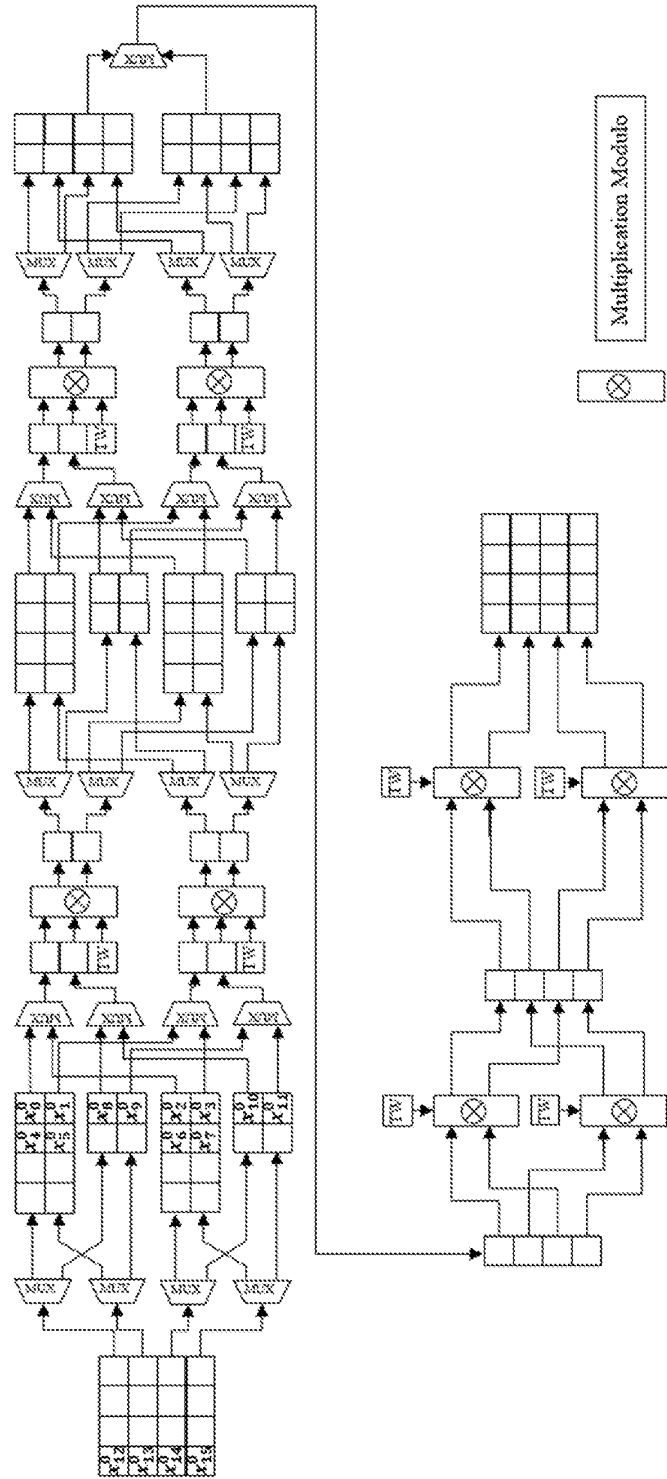
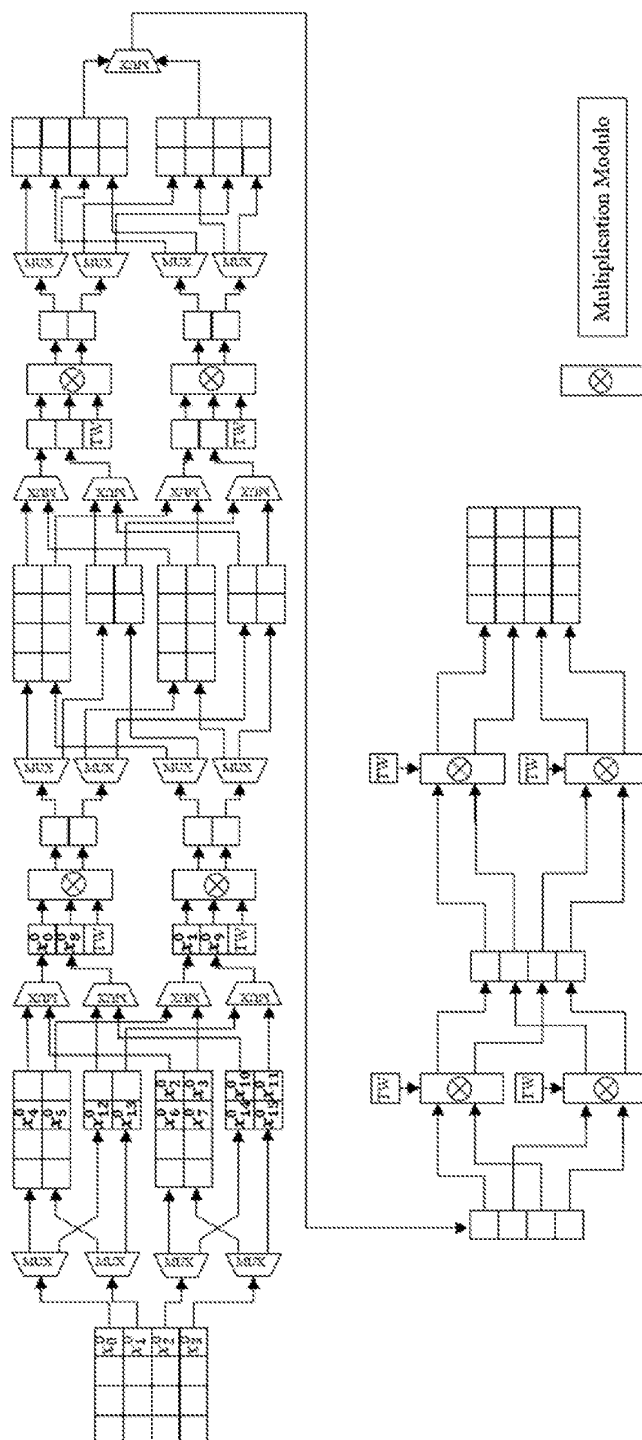
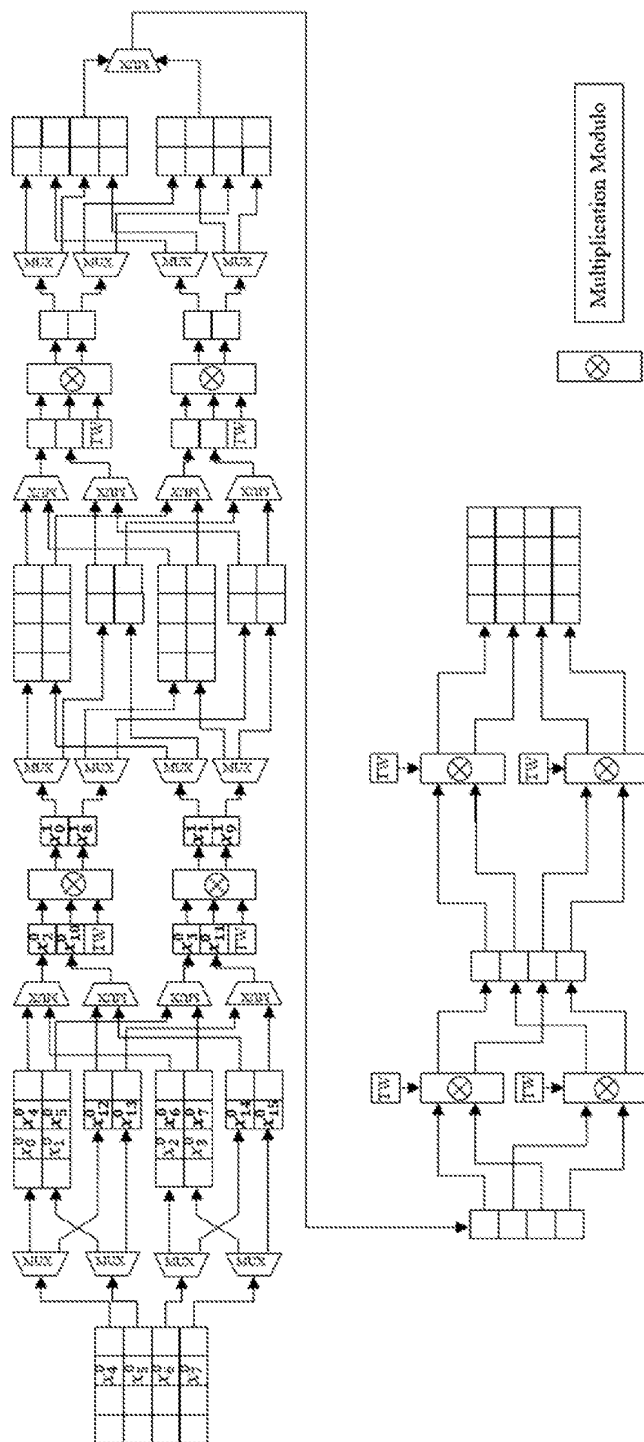


FIG. 31D



**FIG. 31E**



**FIG. 31F**

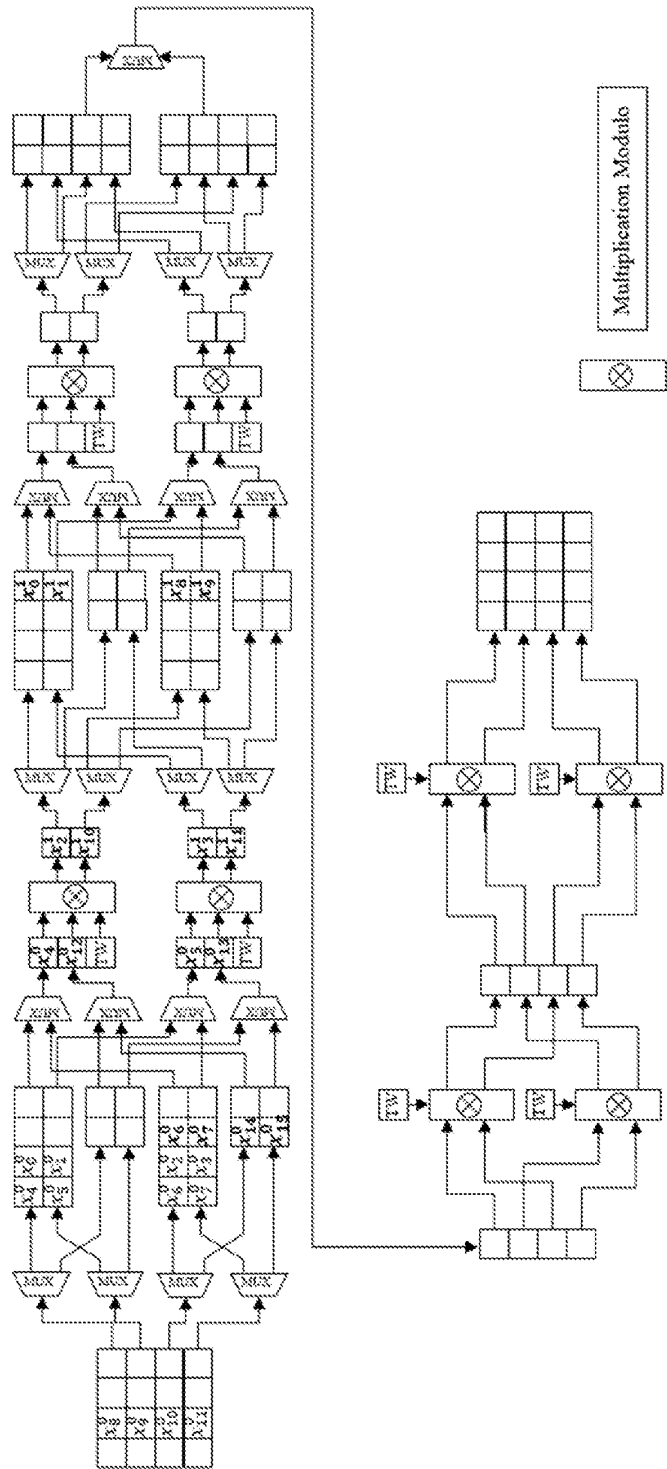


FIG. 31G

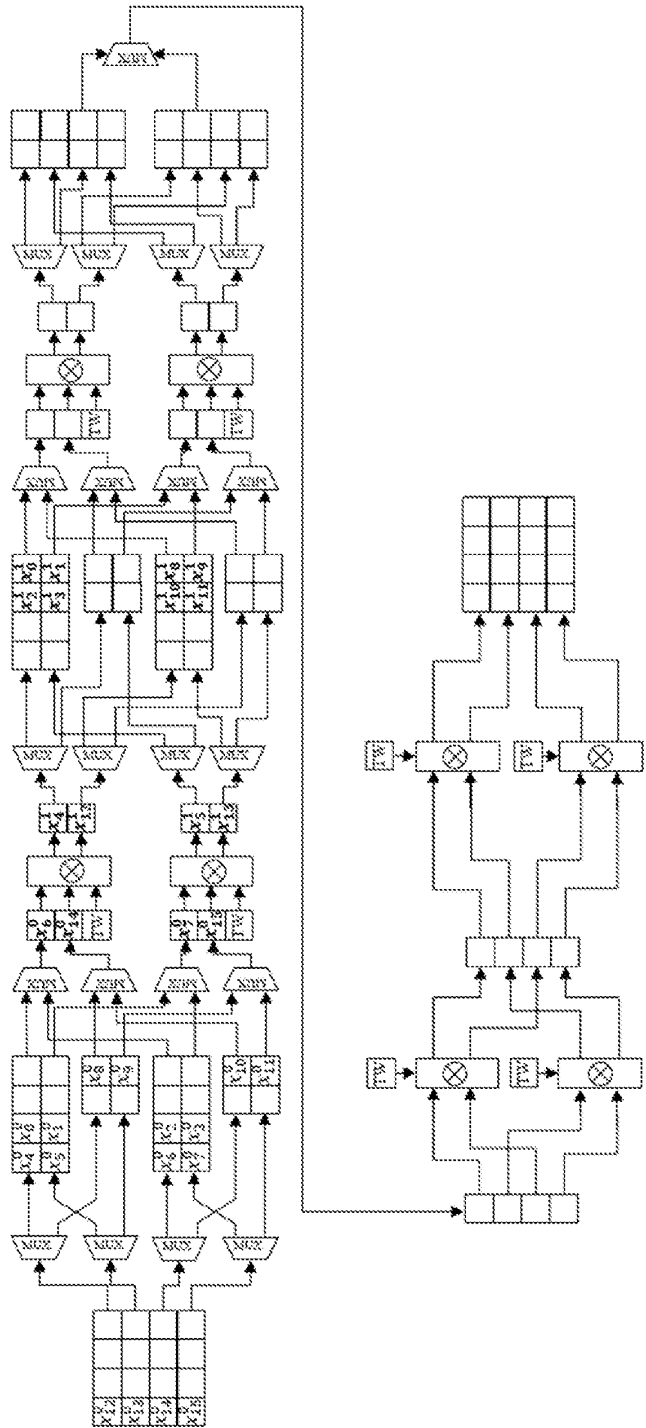


FIG. 31H

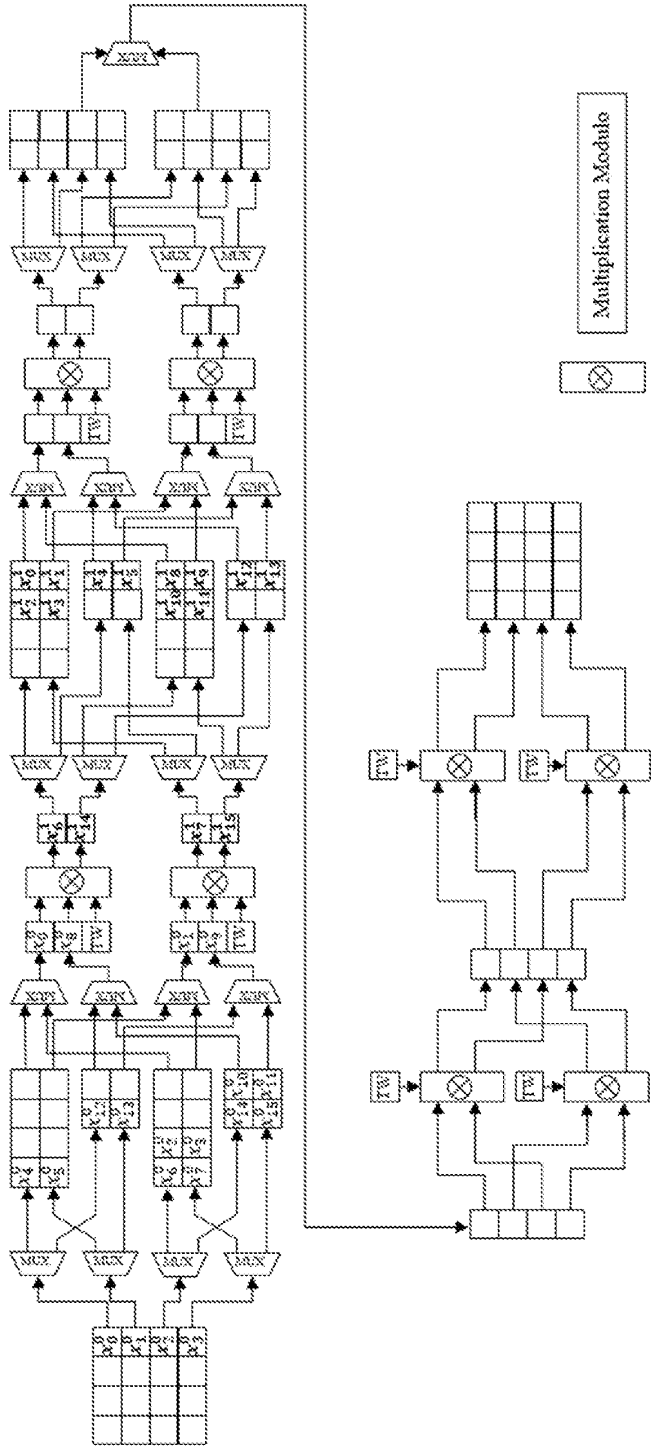
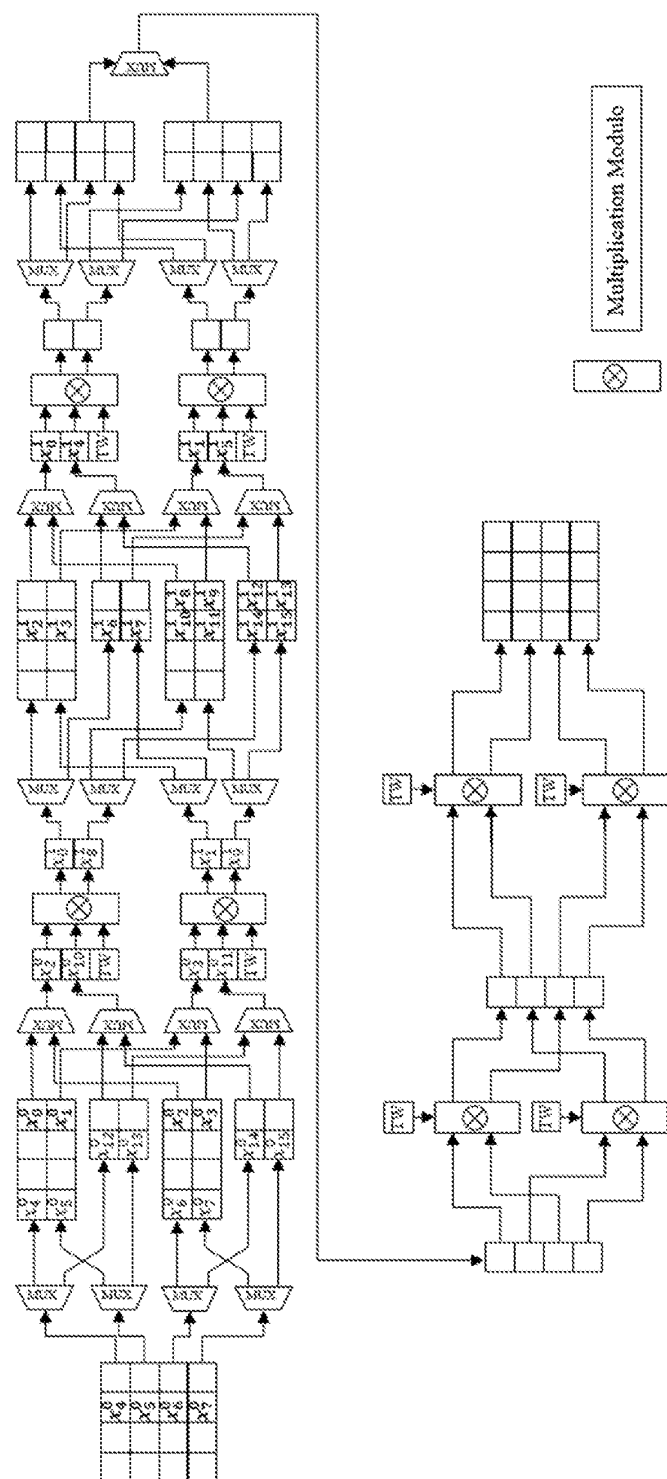


FIG. 31I



**FIG. 31J**

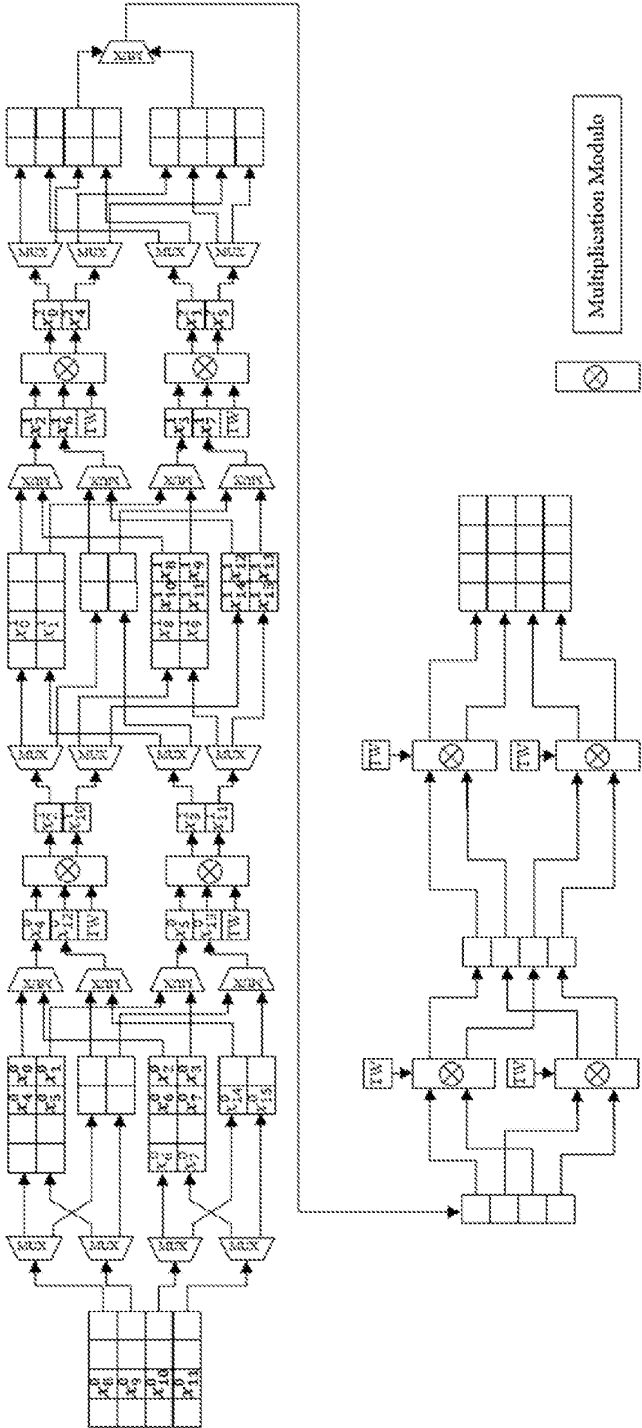


FIG. 31K

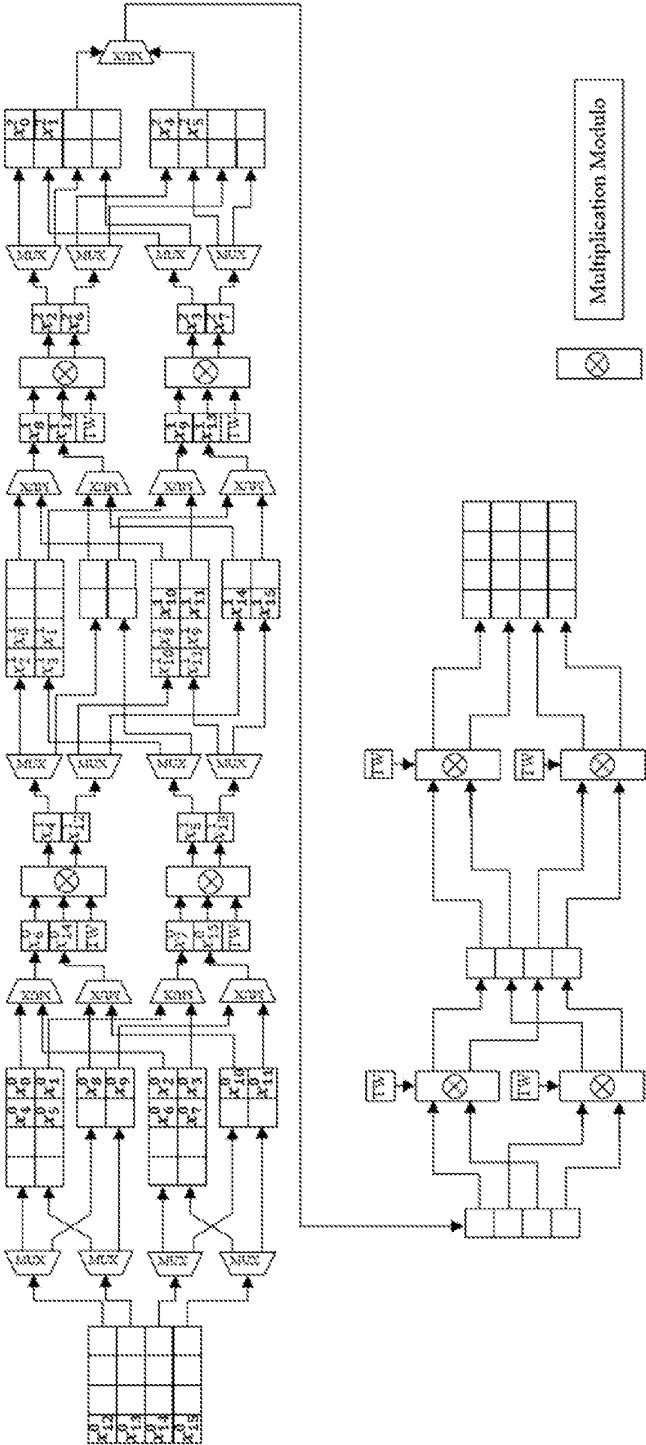


FIG. 31L

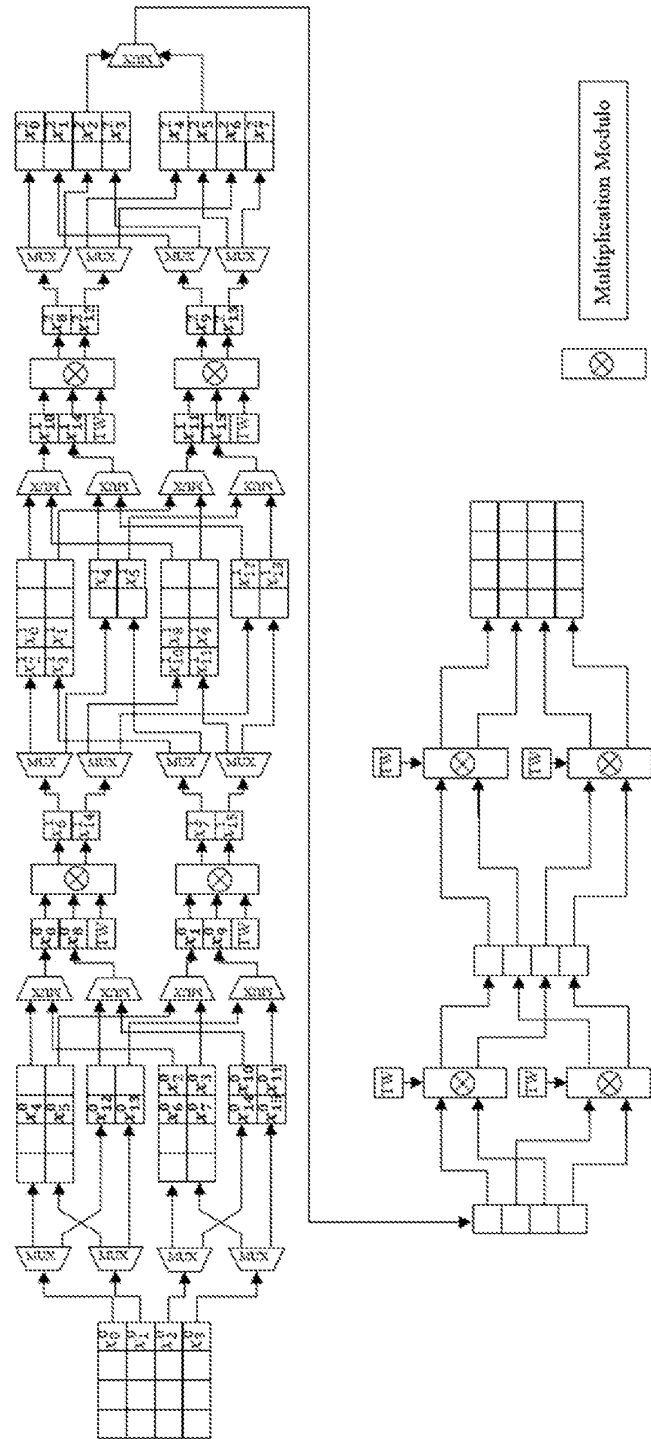


FIG. 31M

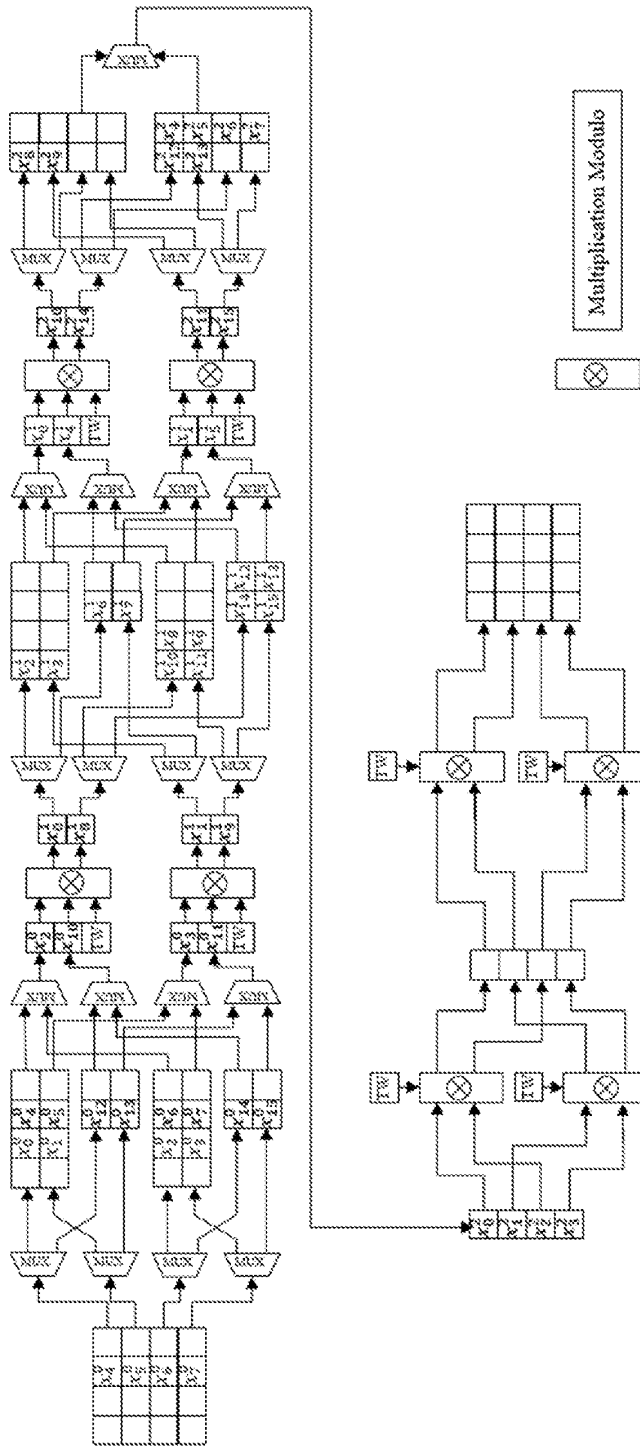


FIG. 31N

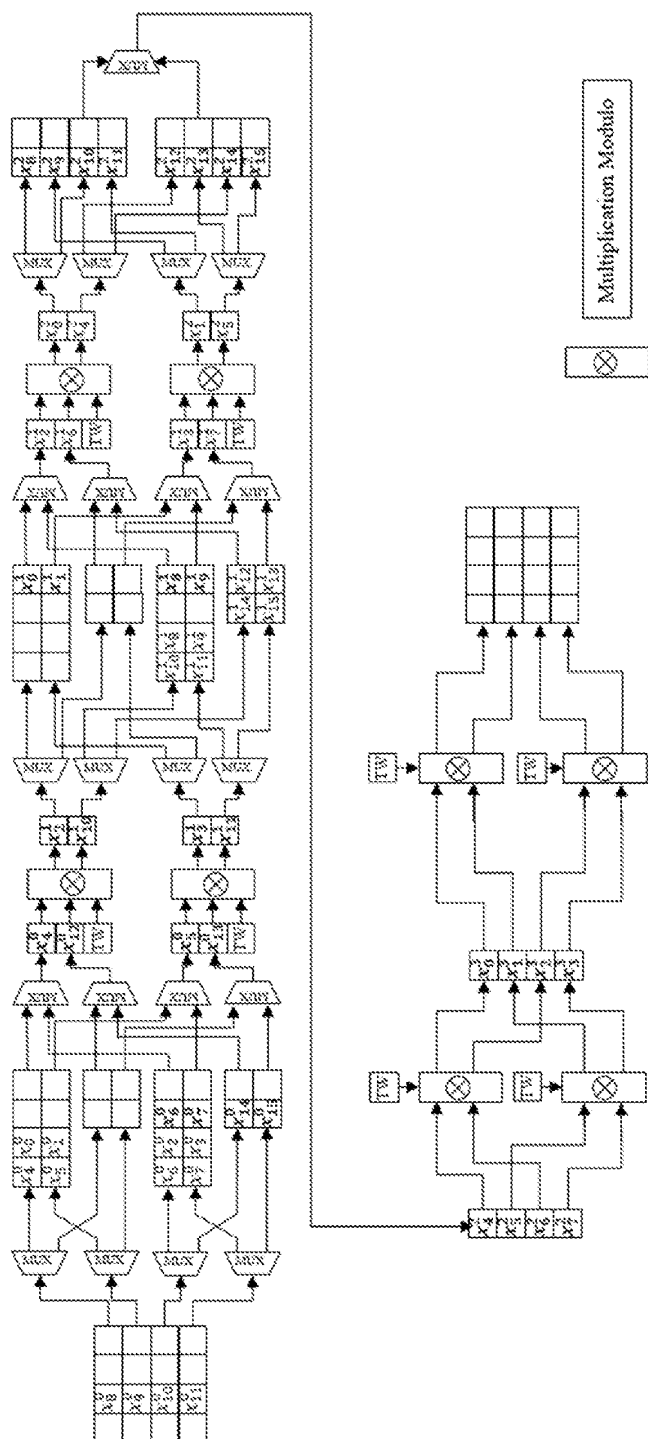


FIG. 310

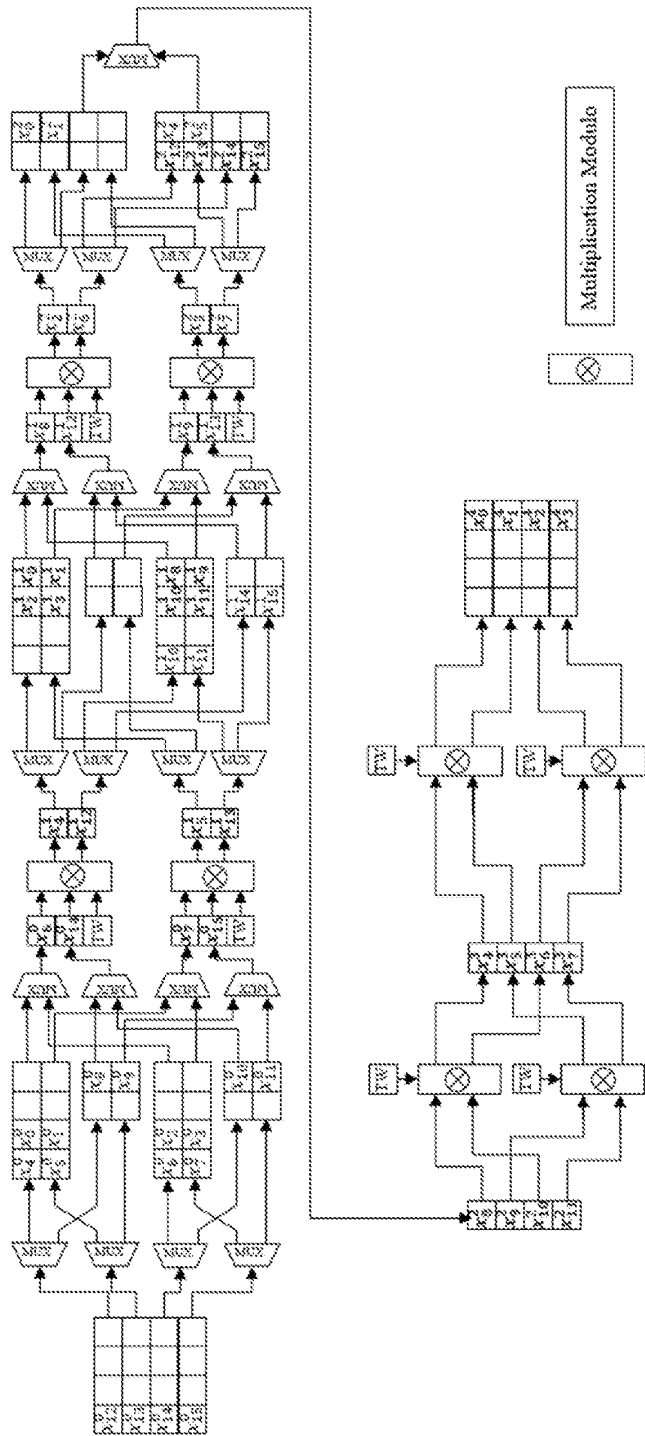


FIG. 31P

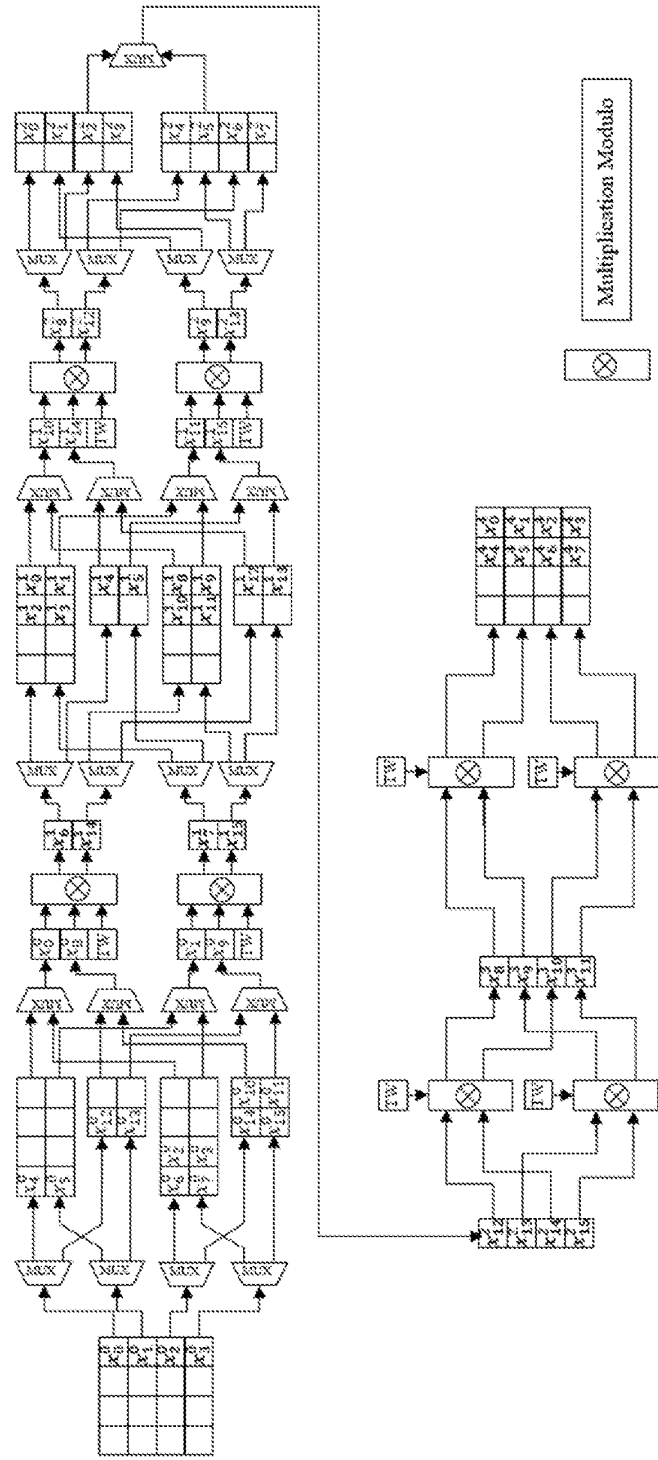


FIG. 31Q

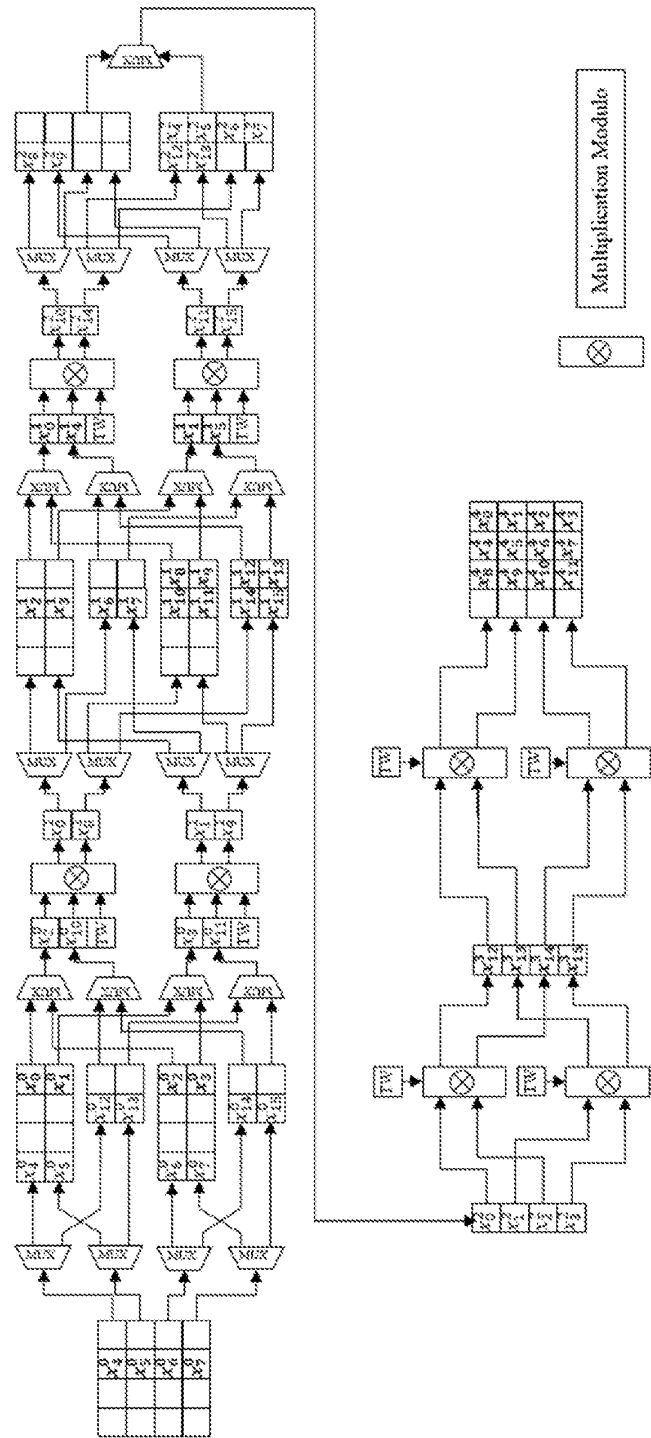


FIG. 31R

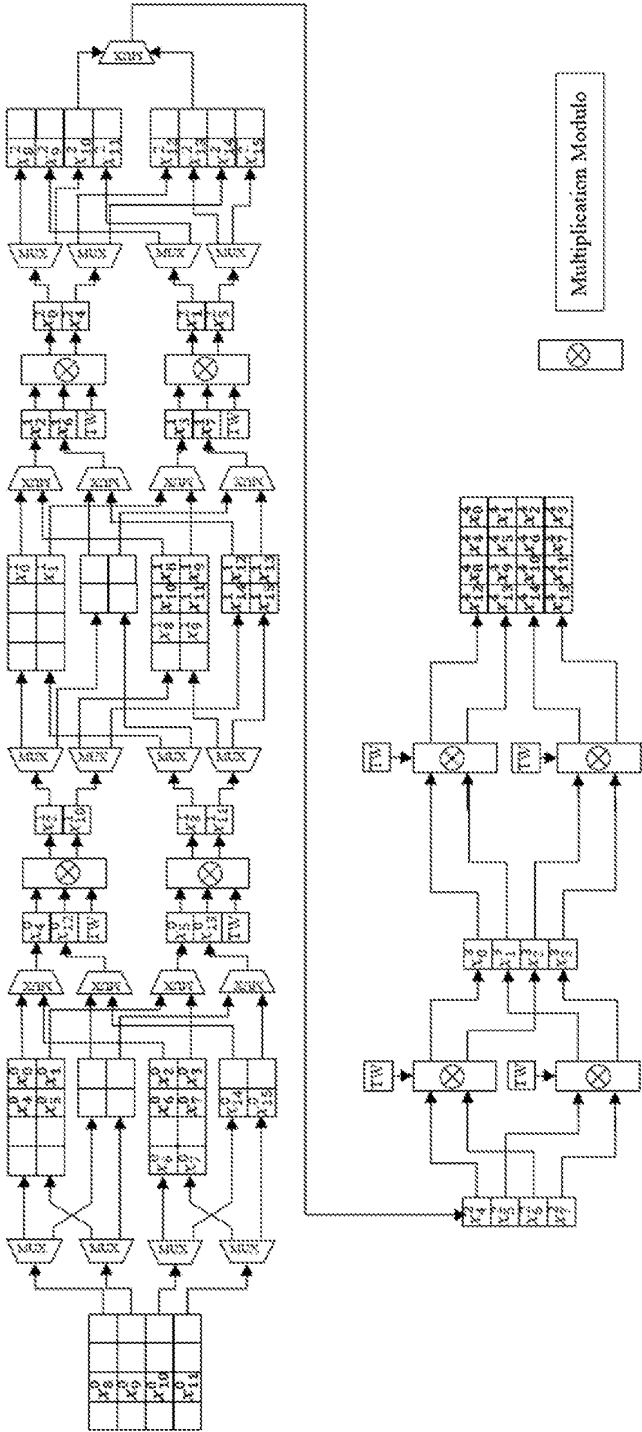


FIG. 31S