KQ

$kT \ln 2 k 1.38 \times 10^{-23} m^2 s^{-2} kg K^{-1} T$
$\delta_\phi \phi = 2^n \delta_\phi n$

$\langle A, B \rangle \xrightarrow{U} \langle A, f(A,B) \rangle U f(A,B) \langle A, B, 0, 0 \rangle \xrightarrow{U} \langle A, B, A+B, G \rangle ABA + BG$

$$\begin{aligned} \langle A, B, 0, 0, 0 \rangle &\xrightarrow{U} \langle A', B', f(A,B), G, 0 \rangle \\ &\xrightarrow{CNOT} \langle A', B', f(A,B), G, f(A,B) \rangle \\ &\xrightarrow{U^\dagger} \langle A, B, 0, 0, f(A,B) \rangle. \end{aligned}$$

$KQGVV^\dagger$

$$\begin{aligned} VV = V^\dagger V^\dagger = X, \\ VV^\dagger = V^\dagger V = I, \end{aligned}$$

XV

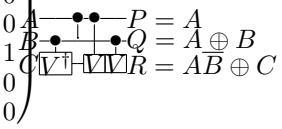
$$V = \frac{1}{2} \begin{pmatrix} 1+i & 1-i \\ 1-i & 1+i \end{pmatrix}.$$

$TT|0\rangle|1\rangle T$

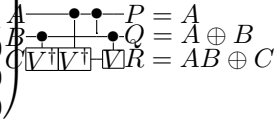
$$T = \begin{pmatrix} 1 & 0 \\ 0 & e^{\frac{i\pi}{4}} \end{pmatrix}.$$

$+$
$\bigcirc$

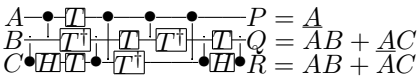
$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix}$$



$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix}$$



$TT^{\dagger}THCNOTTT^{\dagger}T$



$sem_{22}m_{21}..m_0$

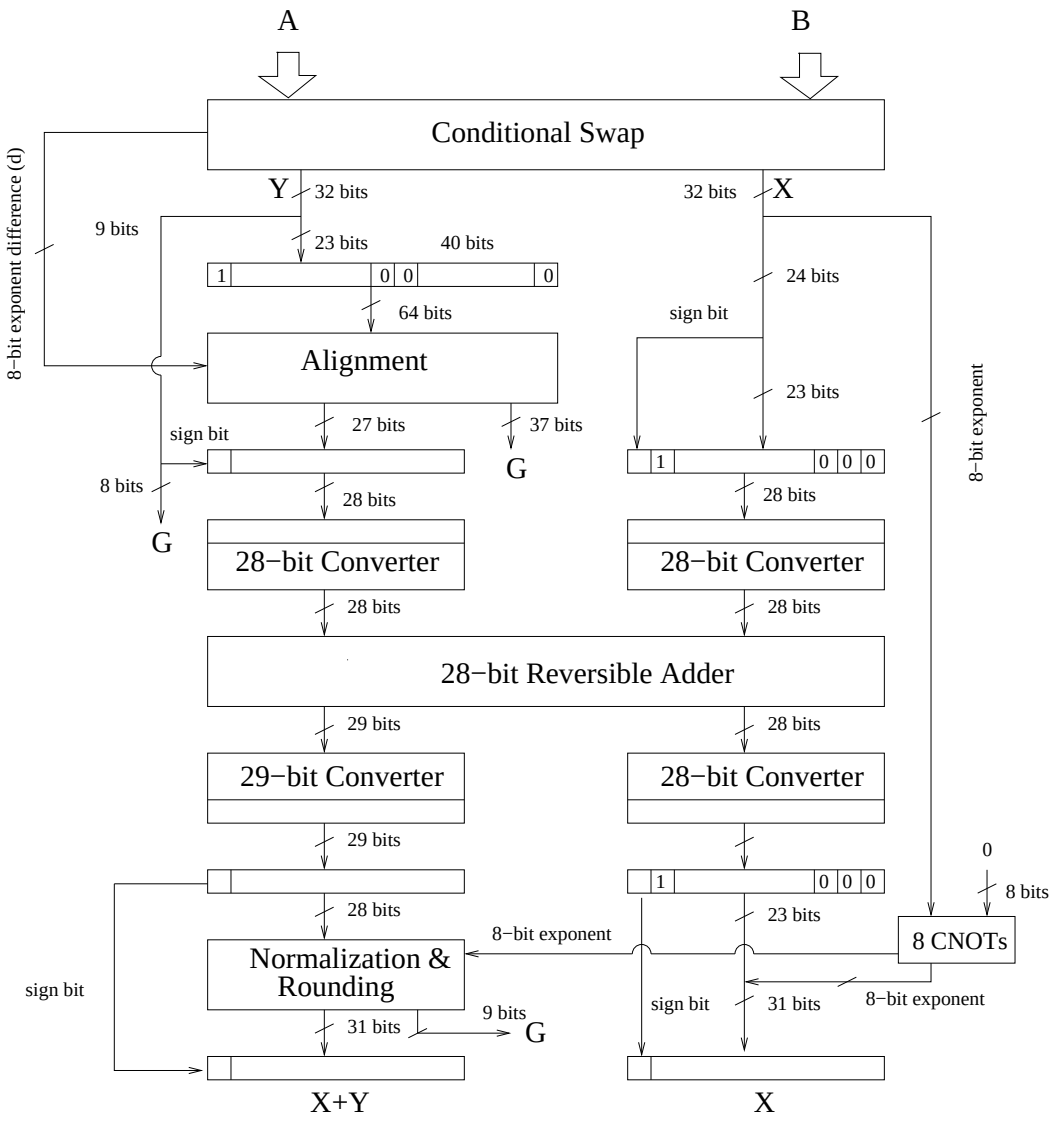
$(-1)^s \times (1.m_{22}m_{21}...m_0) \times 2^{e-127}$

$1.000 + 0.0001 = 1.0000.00000.0004$

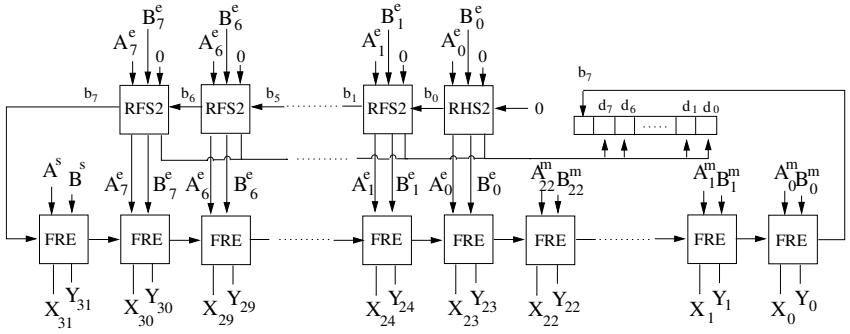
AB

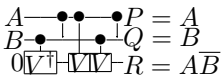
$<$

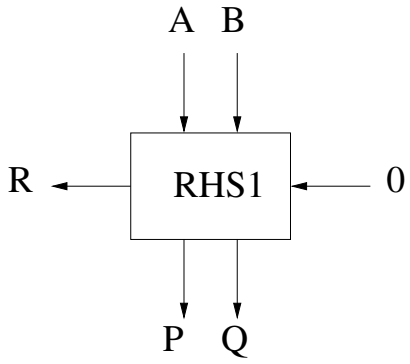
$27^{th}256^{th}$

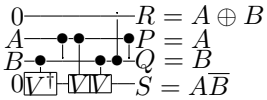


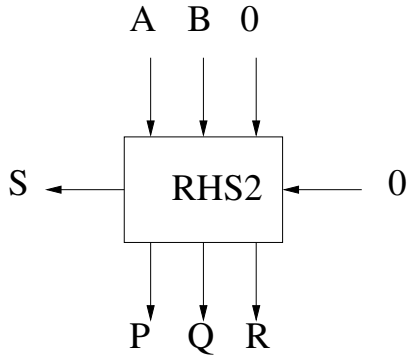
$A_i^e B_i^e A_i^m B_i^m A^s B^s b_i b_7 b_7 d_7 .. d_0$

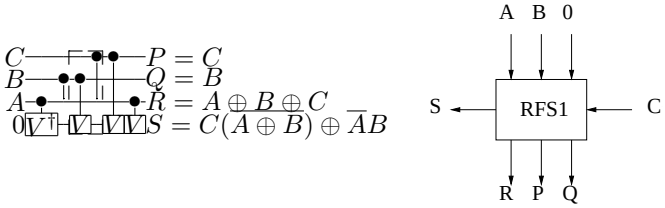

RFS2
RHS2
FRE
0
b7
b6
b5
b1
b0
d7 d6 ..... d1 d0

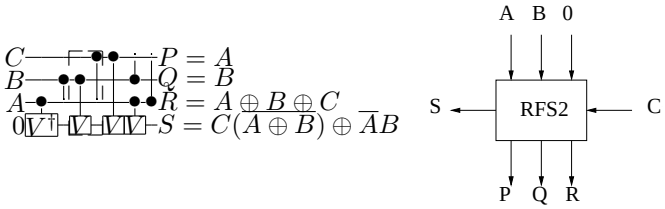

A
B
0
P = A
Q = B
R = AB


A B
R
RHS1
0
P Q

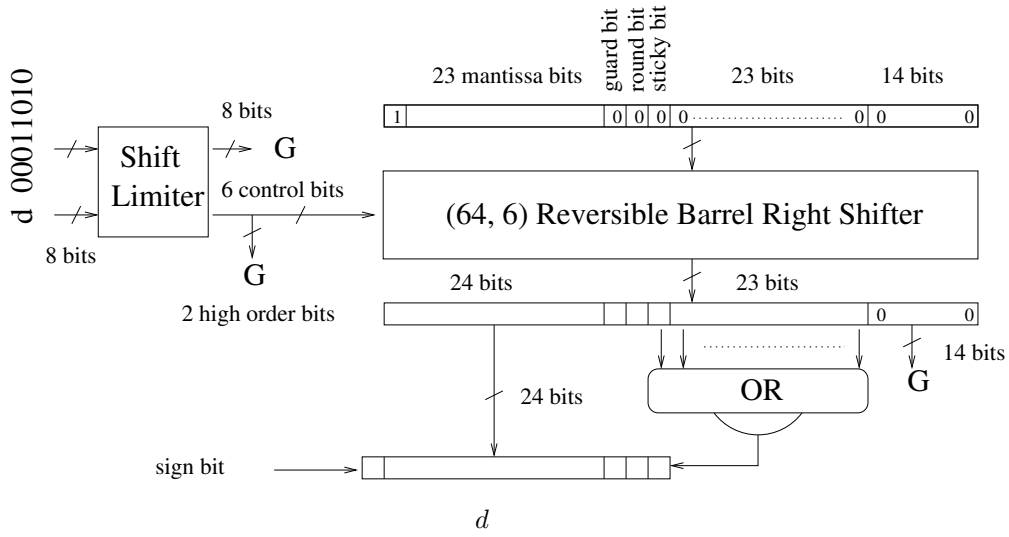

0
A
B
0
R = A ⊕ B
P = A
Q = B
S = AB

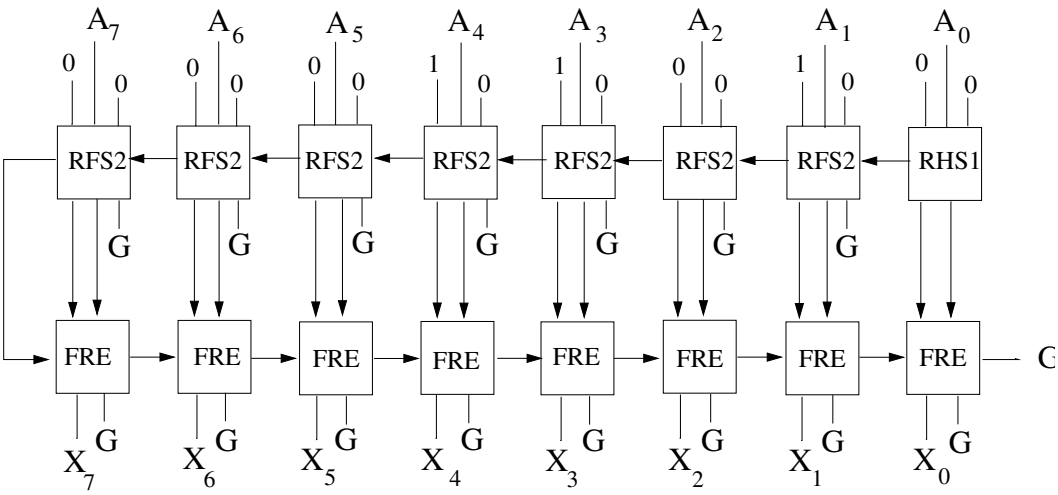

A B 0
S
RHS2
0
P Q R

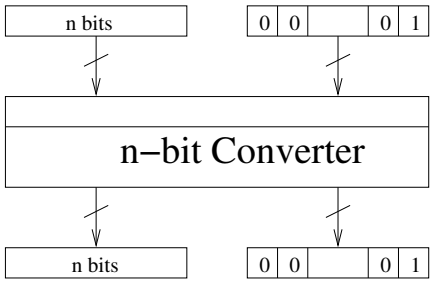

C
B
A
0
P = C
Q = B
R = A ⊕ B ⊕ C
S = C(A ⊕ B) ⊕ AB
A B 0
S
RFS1
C
R P Q

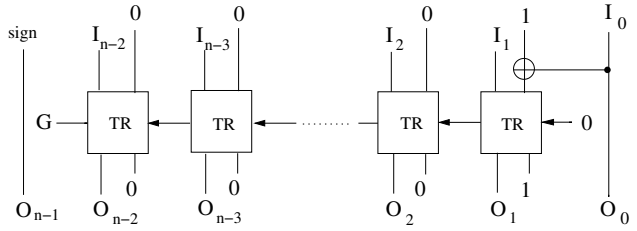

C
B
A
0
P = A
Q = B
R = A ⊕ B ⊕ C
S = C(A ⊕ B) ⊕ AB
A B 0
S
RFS2
C
P Q R

$ACABR$


d 00011010
8 bits
Shift Limiter
8 bits
G
6 control bits
G
2 high order bits
guard bit
round bit
sticky bit
23 mantissa bits
23 bits
14 bits
1
0 0 0 0
0 0 0
(64, 6) Reversible Barrel Right Shifter
24 bits
23 bits
0 0
14 bits
G
OR
24 bits
sign bit
d





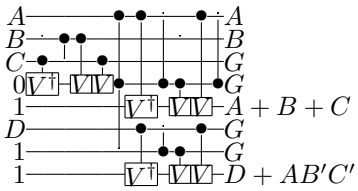


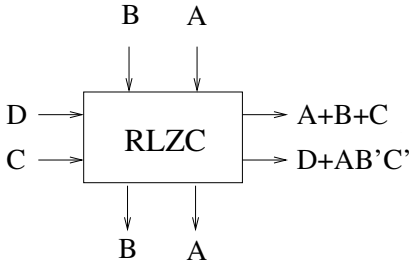
n

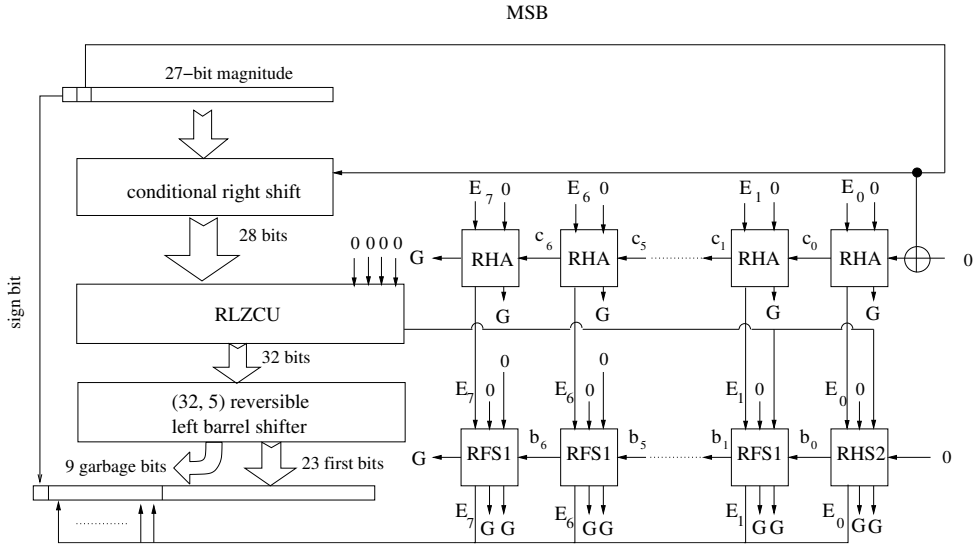
$nn-2$

$n-1n$

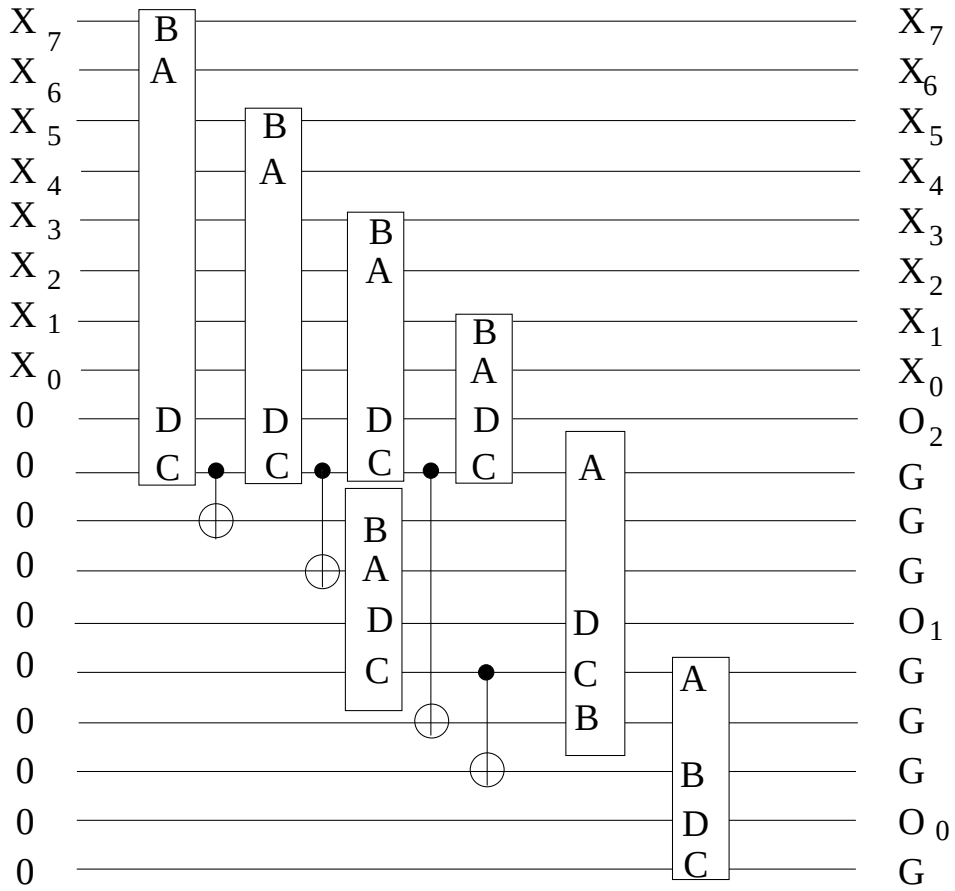
$c_i b_i$





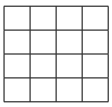


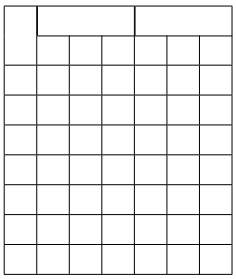
$X_7X_6...X_0001110100102O_2O_1O_0$



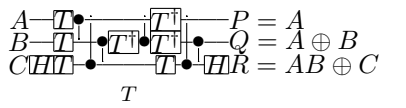
	$5n-4$	n	n
	$4n-7$	1	$n-1$

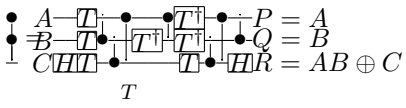
$n-1n-2$
n

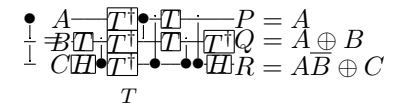




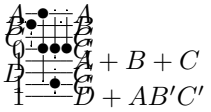
$VV^\dagger VV^\dagger$



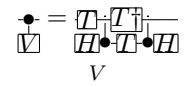




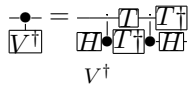
T



$VV^\dagger$
$VV^\dagger V^\dagger VV$



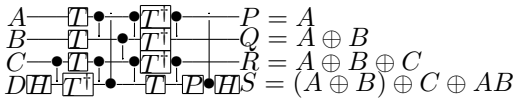
V



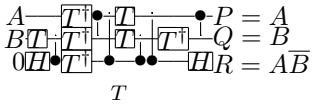
$V^\dagger$

$VV^\dagger$

T



$VV^\dagger$



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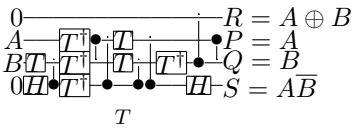
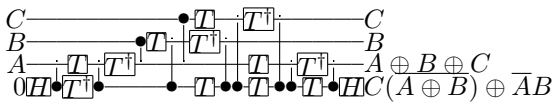


T

$KQKQTKQe \ll 1/KQ$
TKQ
$KQKQ$

$\langle A', B', f(A, B), G\rangle A'B'G$

$\Theta(\sqrt{n})$



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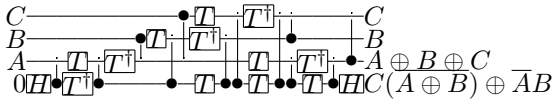

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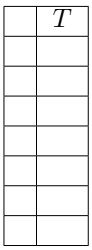

T

$\frac{\pi}{8}$