EXPANSION BOX: THE 4-BIT NEIGHBOR RULE

The standard DES expansion repeats boundary bits to convert 32 bits into 48 bits

RULE: Previous last bit + current 4 bits + next first bit = 6 bits

R0 = 43423234 (8 hexadecimal digits = 32 bits)

Start with the FIRST 4-bit group (hex 4 = 0100)

Last bit of previous nibble	Current four bits	First bit of next nibble
0	0100	0

0 + 0100 + 0 = 001000

FIRST EXPANDED GROUP

001000 (6 bits)

EXPANSION BOX: EXPAND ALL EIGHT GROUPS

Compute each 6-bit group using both neighboring 4-bit groups

DES | DECRYPTION

GROUP	PREVIOUS	CURRENT FOUR	NEXT	SIX-BIT OUTPUT
1	0	0100	0	001000
2	0	0011	0	000110
3	1	0100	0	101000
4	0	0010	0	000100
5	0	0011	0	000110
6	1	0010	0	100100
7	0	0011	0	000110
8	1	0100	0	101000

FINAL 48-BIT RESULT

206A041A41A8

EXPANSION BOX: STANDARD DES E TABLE

Official E selection positions confirm the same 48-bit output

DES | DECRYPTION

Each entry gives the original bit position to copy.

32	01	02	03	04	05
04	05	06	07	08	09
08	09	10	11	12	13
12	13	14	15	16	17
16	17	18	19	20	21
20	21	22	23	24	25
24	25	26	27	28	29
28	29	30	31	32	01

R0 = 43423234

32 bits

E(R0) = 206A041A41A8

48 bits