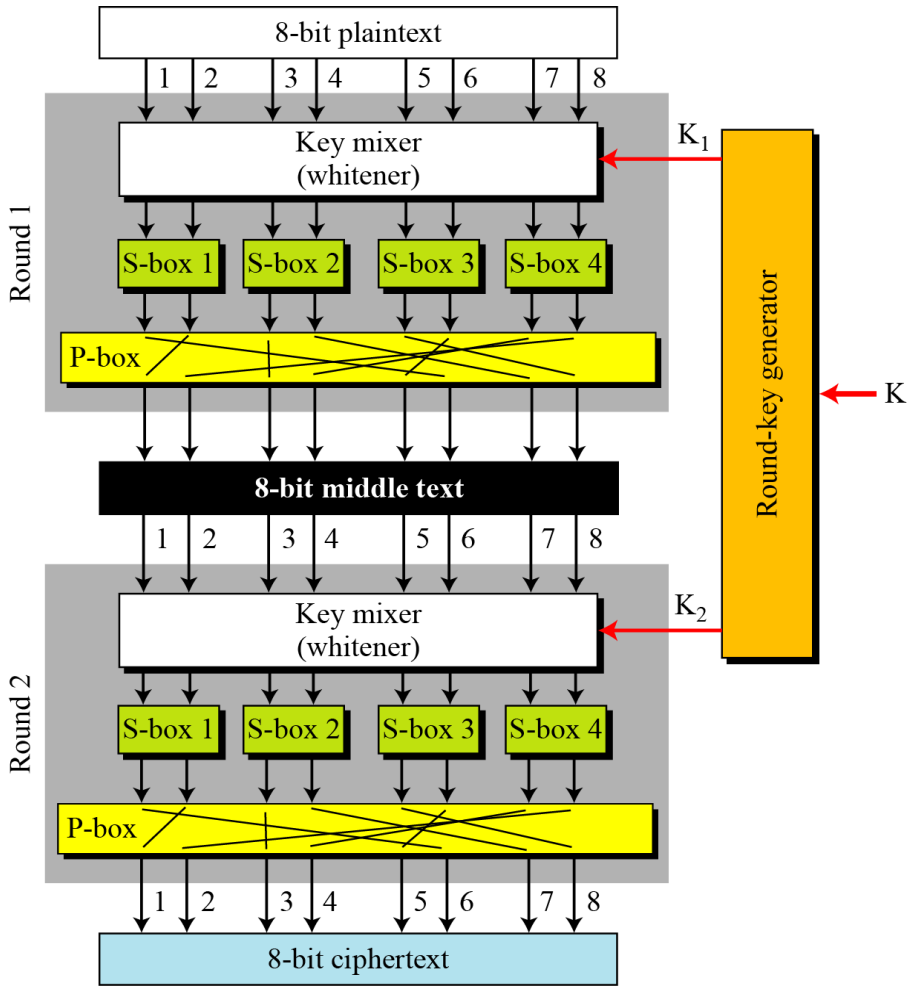
1. Take a plaintext. Divide it into 8 bit blocks. Perform the following operations in two rounds. The key is also 8 bit and the Key mixer is the bitwise XOR operation.

Implement the encryption-decryption system.

Let a S-Box is defined as.

I/P	O/P
00	10
01	11
10	00
11	01



2. Avalanche effect tells that a small change in the input (plaintext or key) data results in a significantly different ciphertext. Justify this for this case.

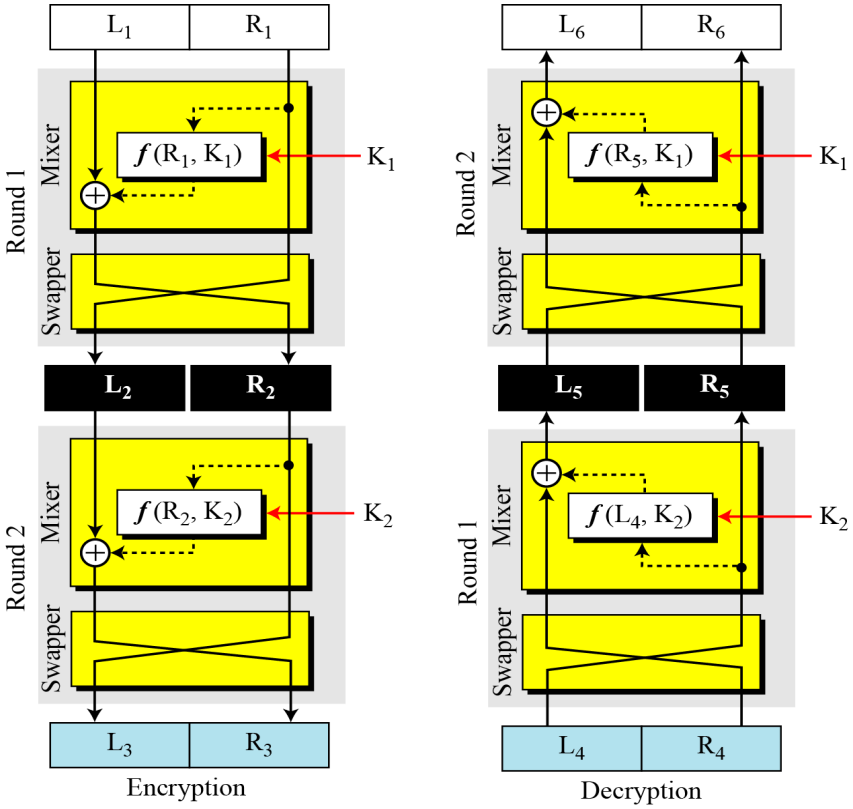
Take a parameter NBCR (Number of bit change rate)

$F(P_1, K) = C_1$

$F(P_2, K) = C_2$

If i^{th} bit of C_1 and C_2 are same then '0', else '1'. Count total number of '1' and find percentage.

3. Implement Feistel cipher as shown over a plaintext by dividing it 8 bit blocks. L and R represents left and right half of each block.



Key is taken as 8 bit. For odd round it rotates circularly left by 2 bits and for even it circularly rotates left by 3 bits. After rotation, for each cases the first and last bits are taken, then perform decimal, make the result square and again make it binary (four bit).

This is the key to be used in different rounds. The function f is the bitwise XOR operation.

4. Show that Avalanche effect is also preserved for this case.