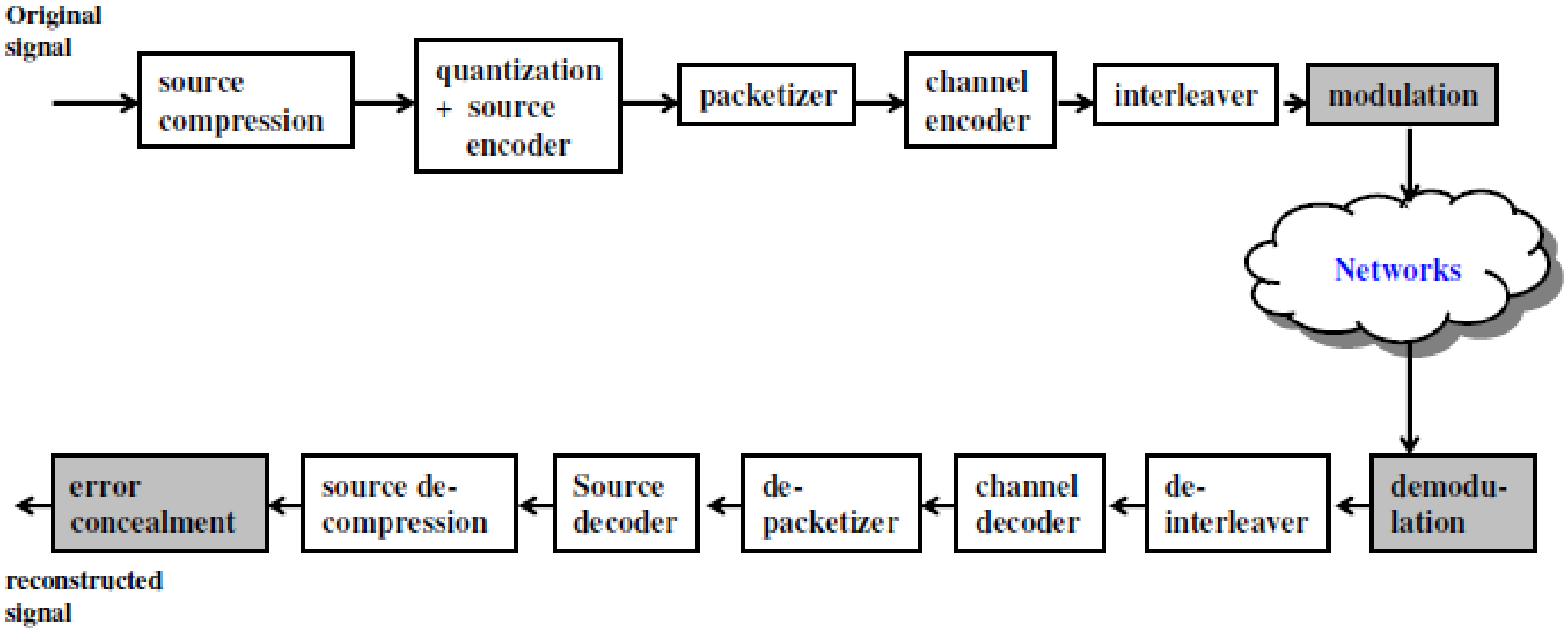
Basic Building Blocks in an IP-based Image/Video Communication System

Laboratory Exercise 3

SSY150

Block diagram of the case study



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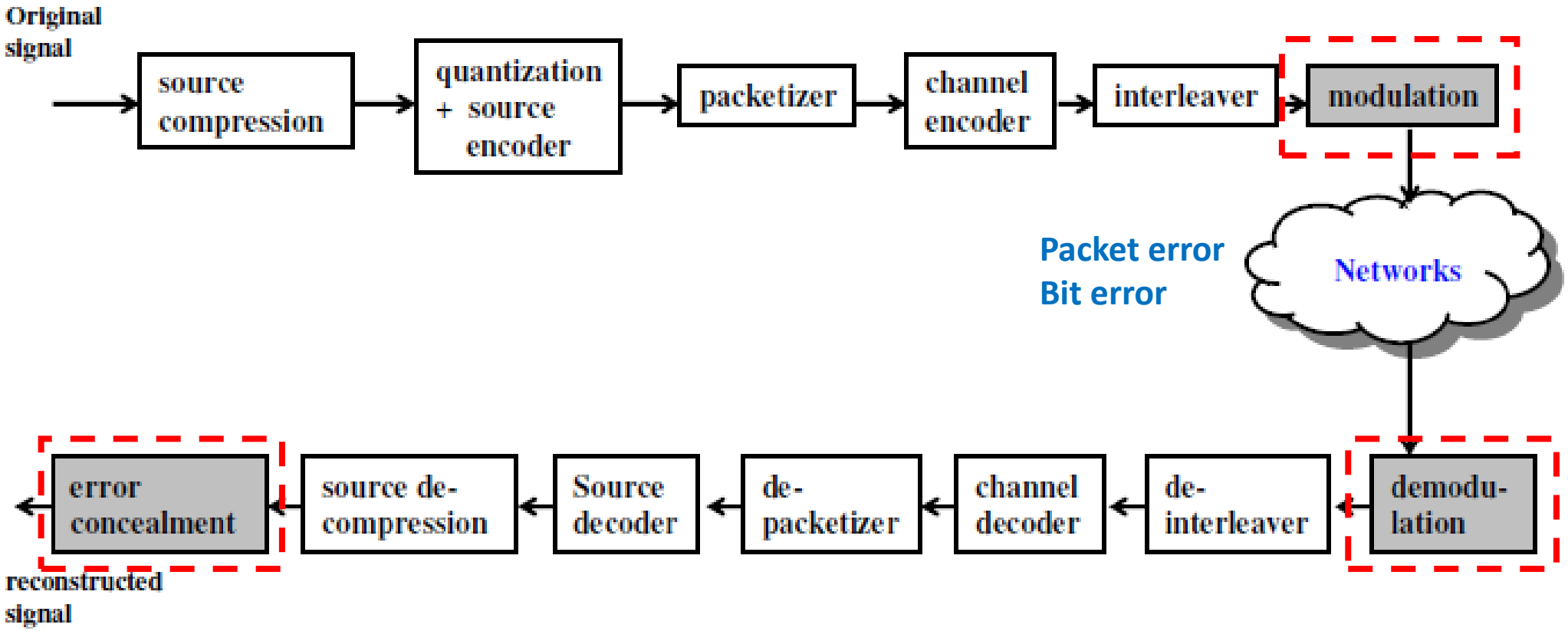
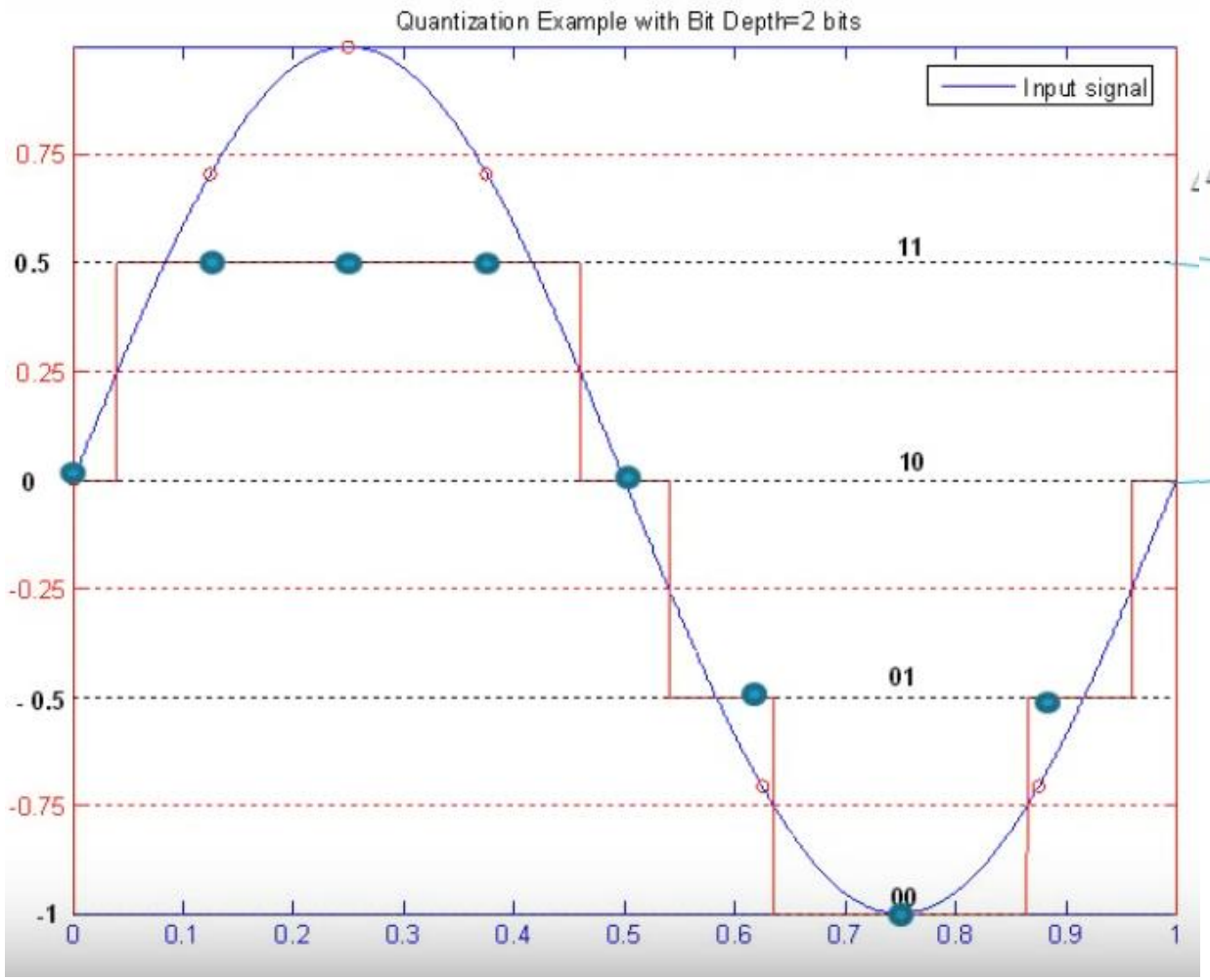


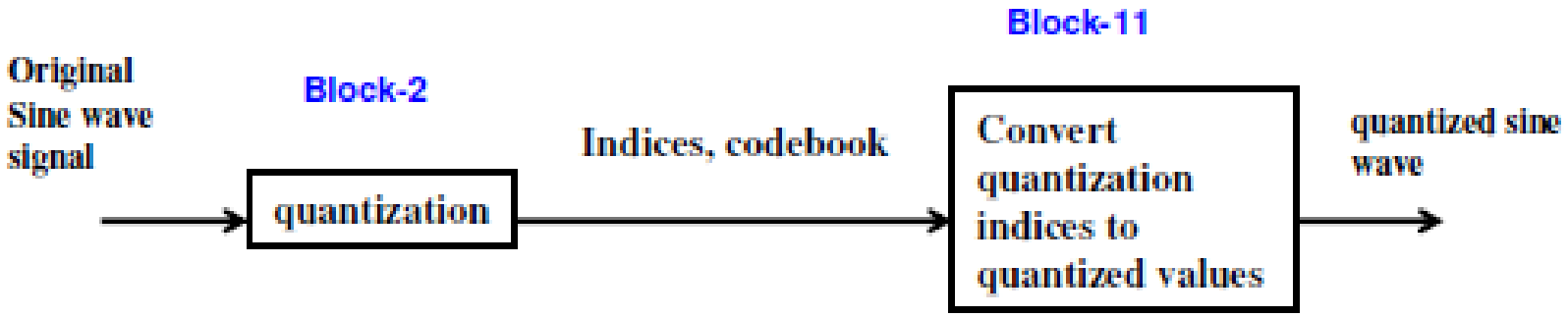
Quantization:

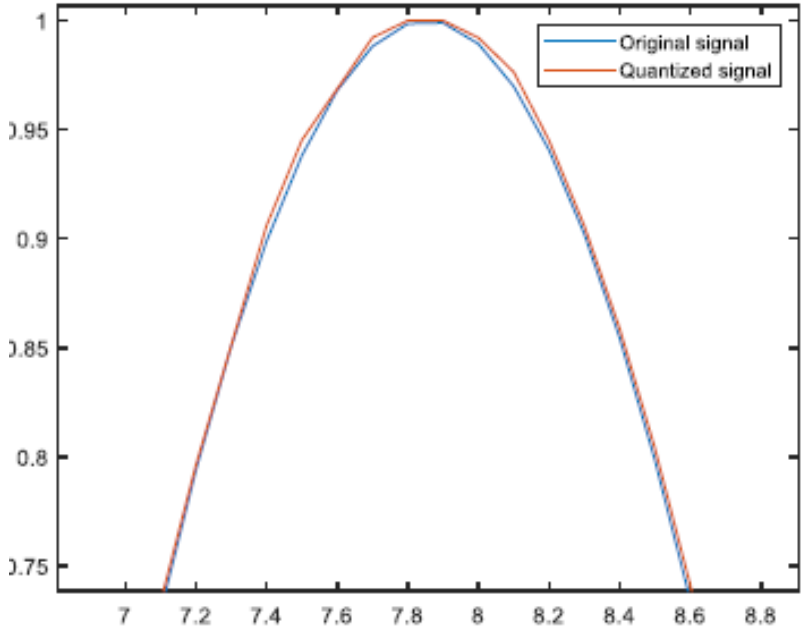
Func: quantiz()

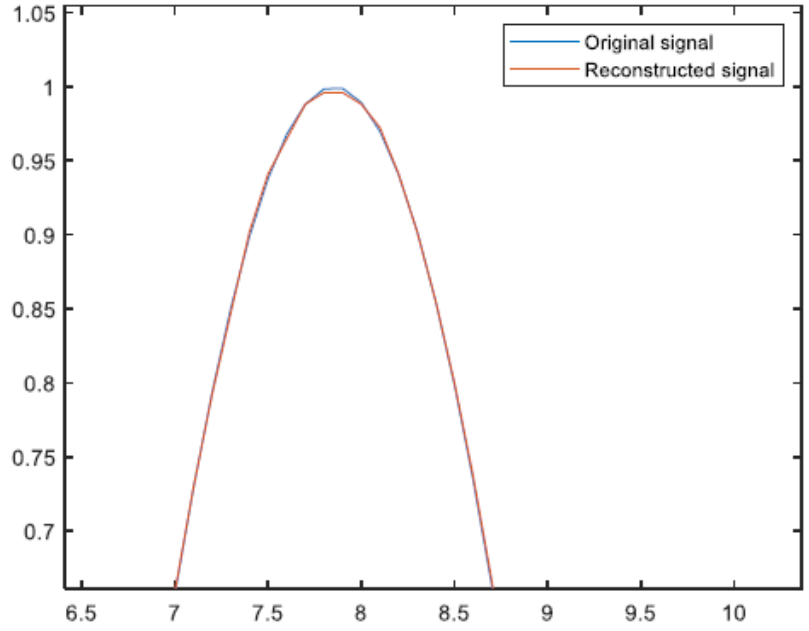


$$\Delta = \frac{X_{\max} - X_{\min}}{2^n}$$

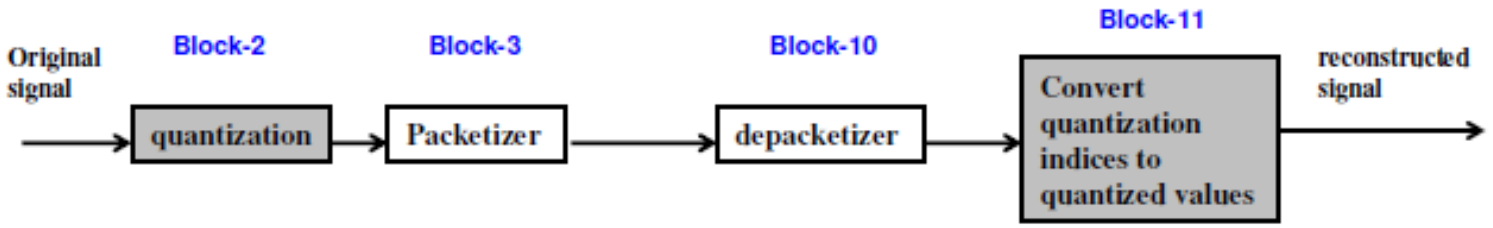
Task-1: Scalar Quantization

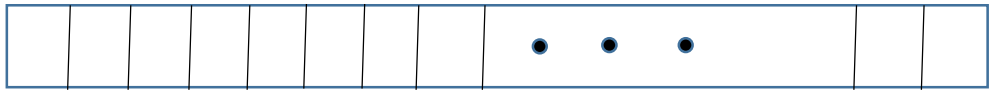






Task 2: Packetization and depacketization

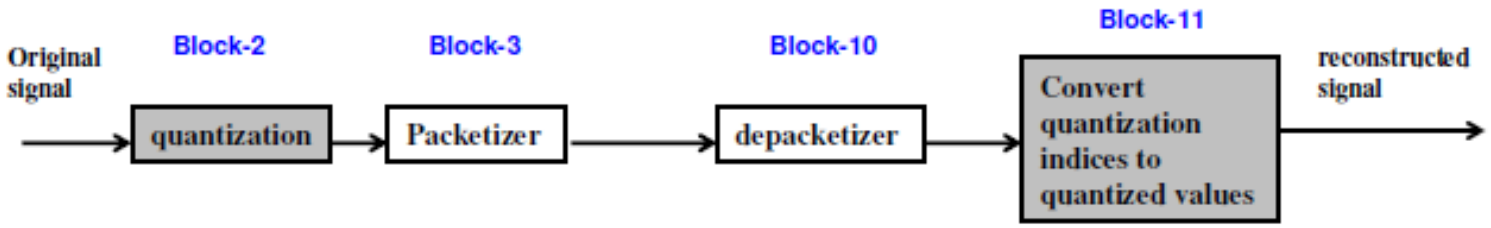


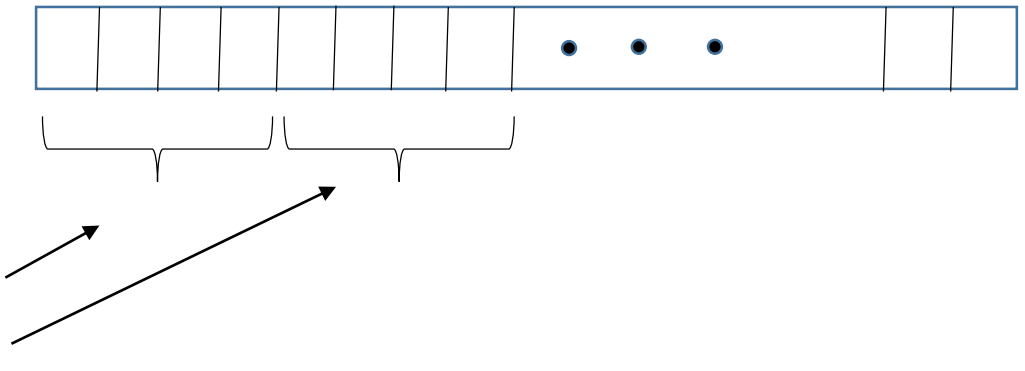


Packet 1

Packet 2

Task 2: Packetization and depacketization

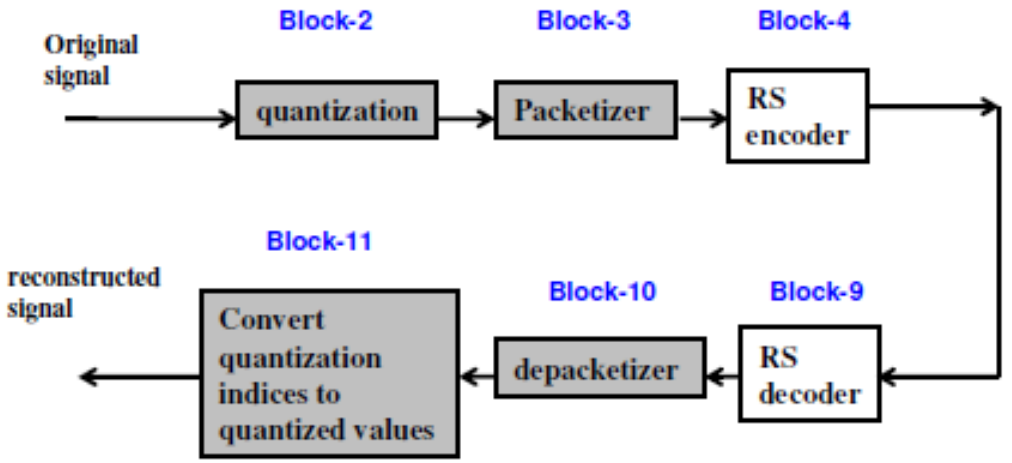




Task3: RS (Reed-Solomon) encoding and decoding

- RS(n,k) is a block coding method.

notation	definition
n	number of symbols per codeword
k	number of symbols per message
m	number of bits per symbol
$t = \lfloor (n-k)/2 \rfloor$	maximum error correcting capability



- RS codes are based on Galois field (GF)

GF(3) = {0,1,2}

$2^0 = 1$

$2^1 = 2$

$2^2 = 4\ mod\ 3 = 1$

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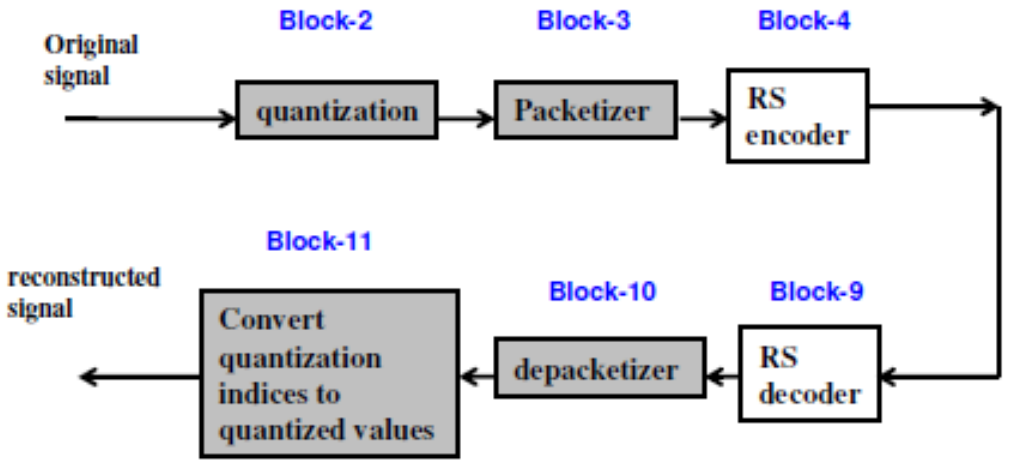

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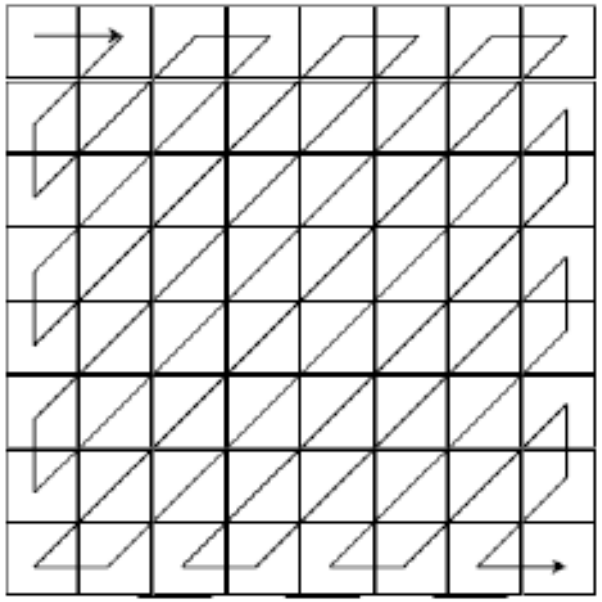
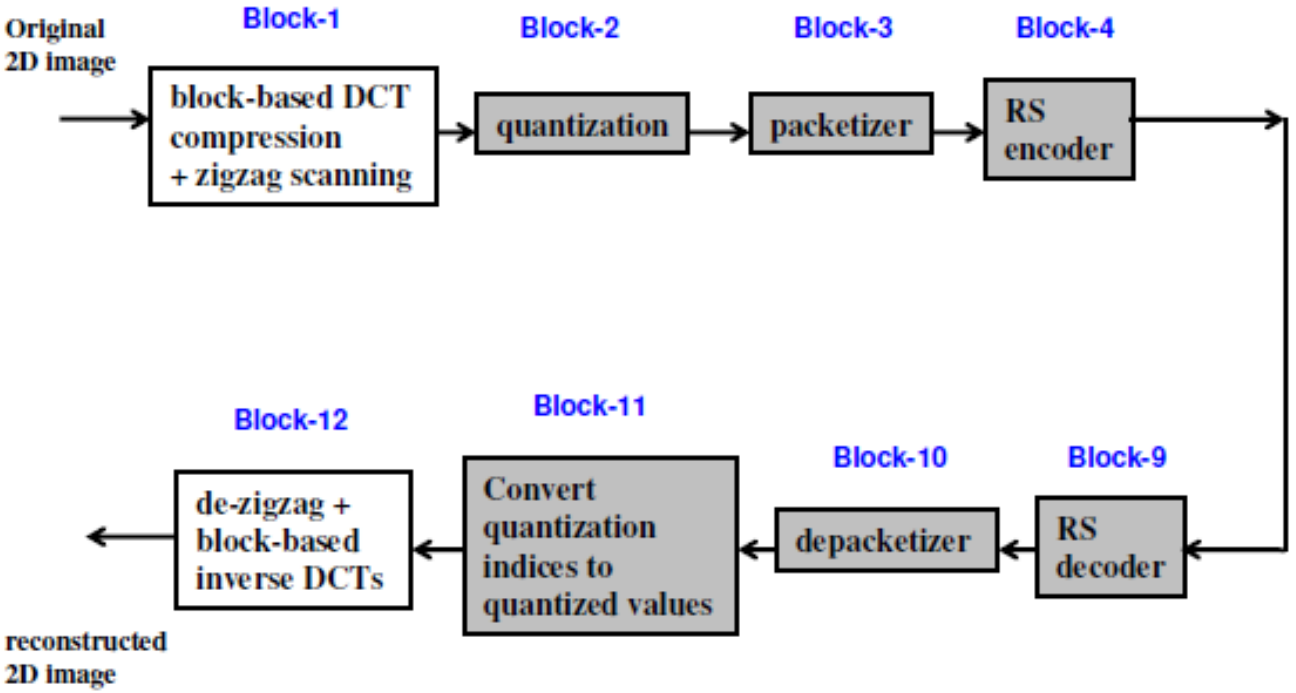
+	0	1	2
0	0	1	2
1	1	2	0
2	2	0	1

Task 4: Image compression Block-based DCT

- Zigzag scanning to produce 1D sequence of coefficient out of all blocks.





Task 5: Noise bit errors and packet losses.

- Two cases:

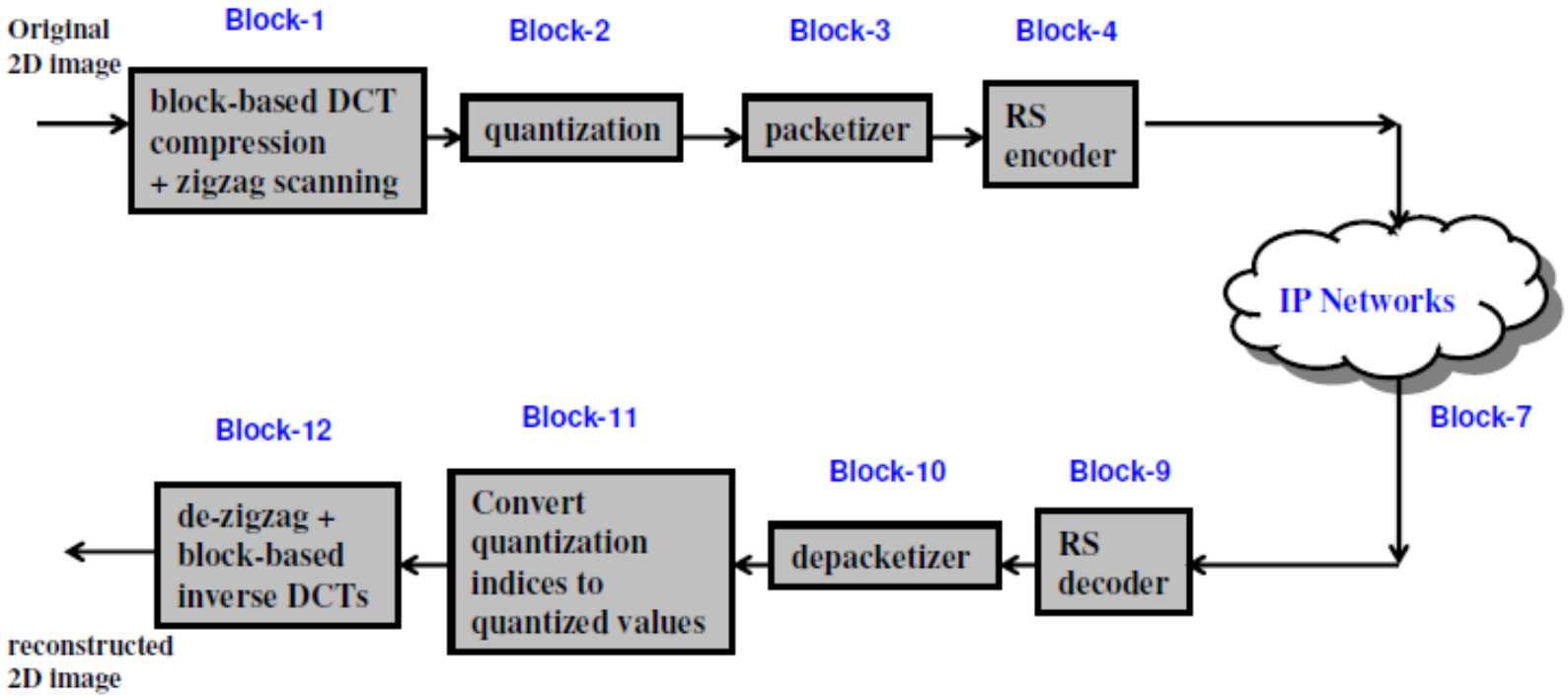
1) Bit errors in the channel

Set t< (n-k)/2

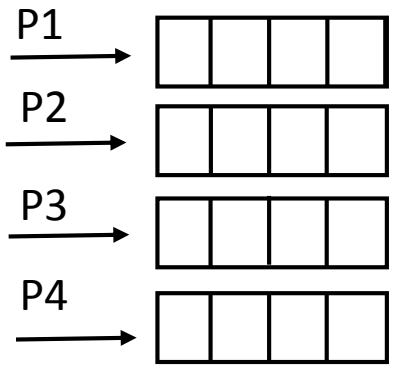
Set t>(n-k)/2

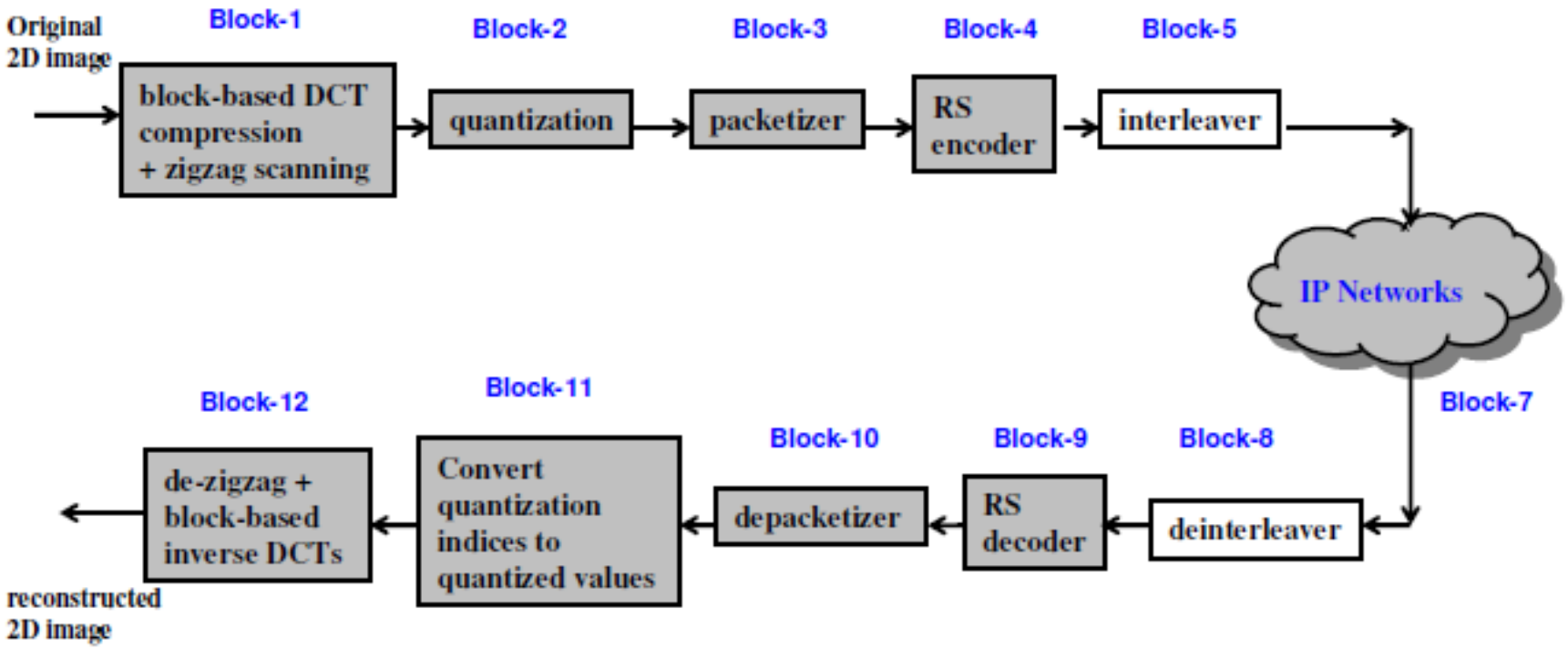
2) Network packet loss

e.g: 10% of the packets



Task 7: Adding matrix interleaver and deinterleaver





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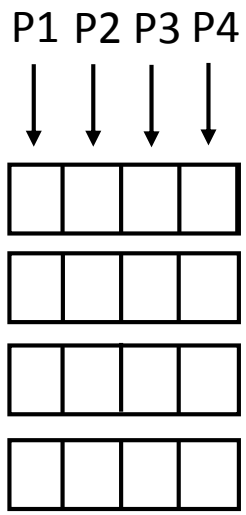

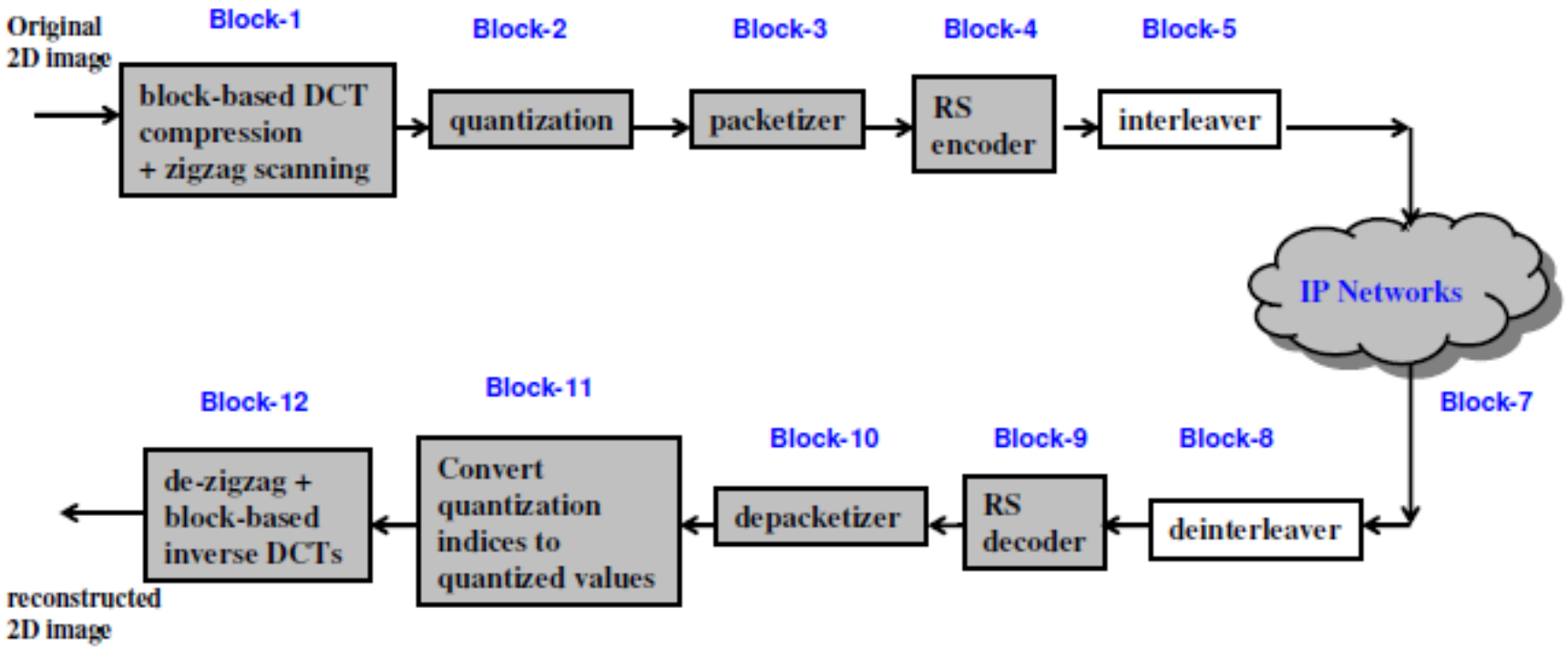

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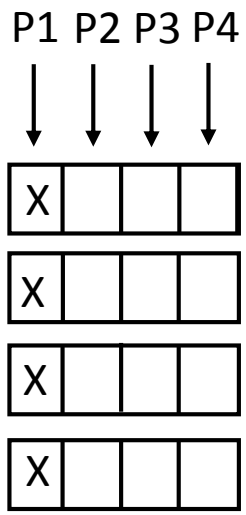

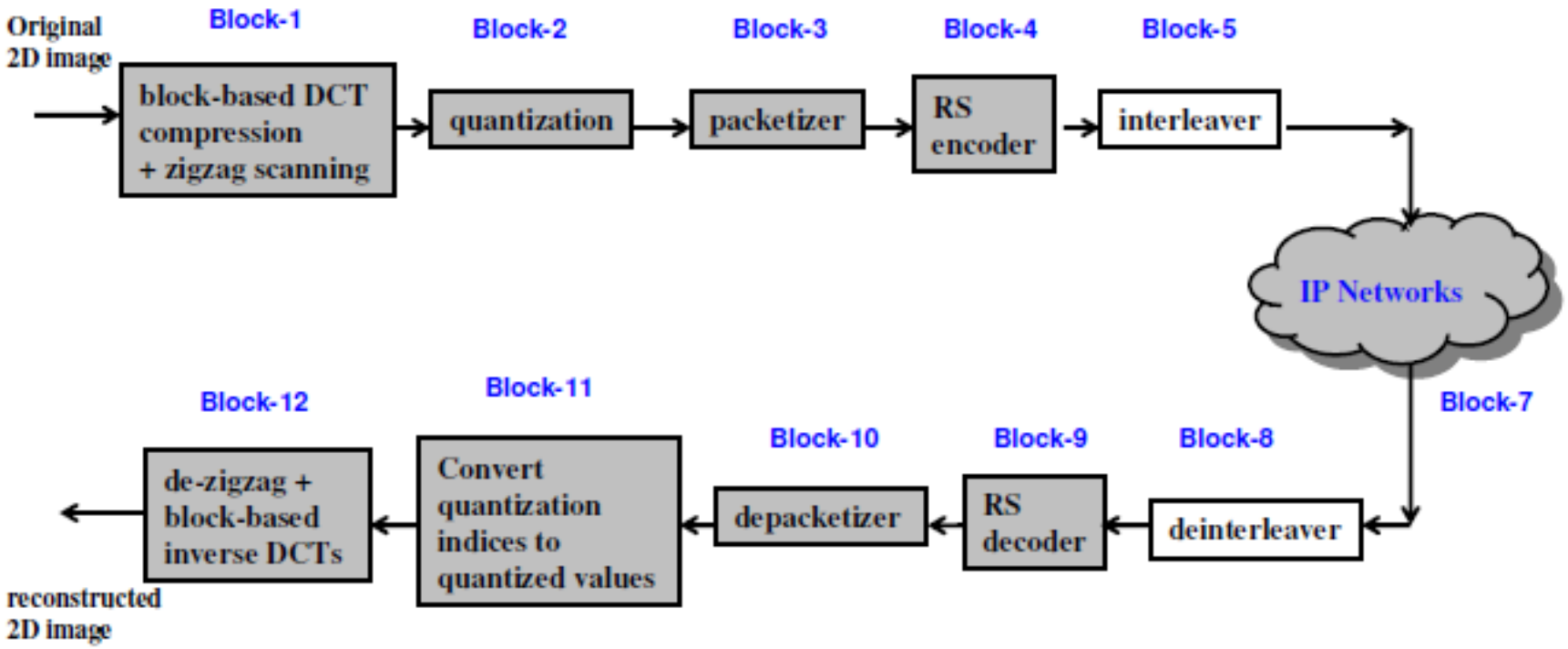

Task 8:

- Test the effect of interleaver de-interleaver on Bit error.
- Test the effect of interleaver de-interleaver on 3% packet loss.
- Compute PSNR and MSSIM.