CT111 PROJECT

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St Id : 201901005
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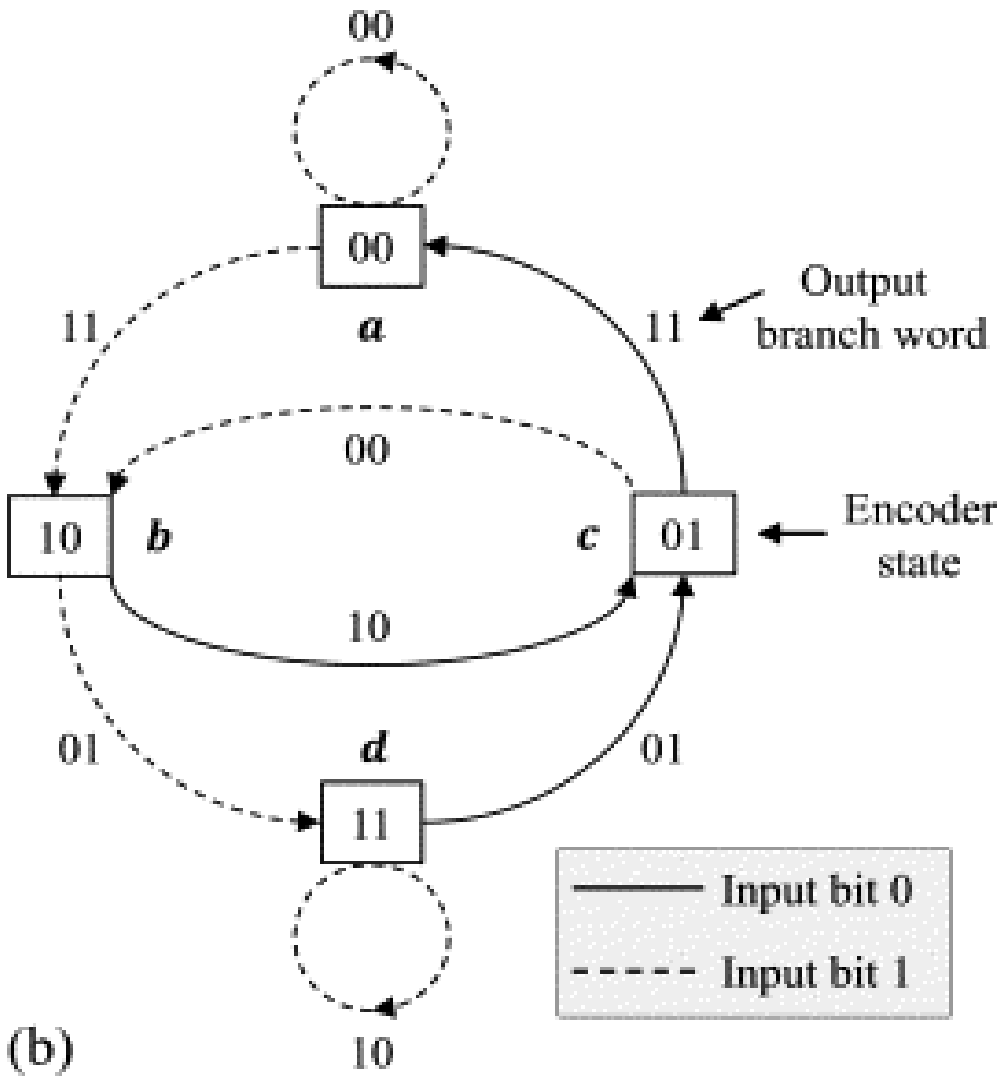
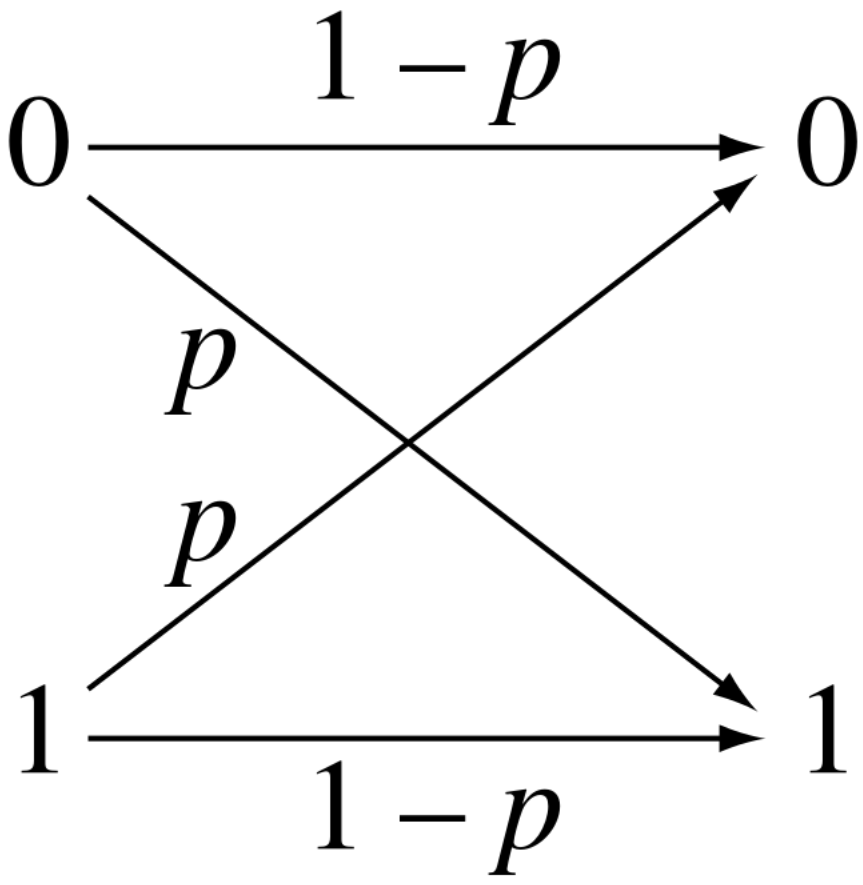
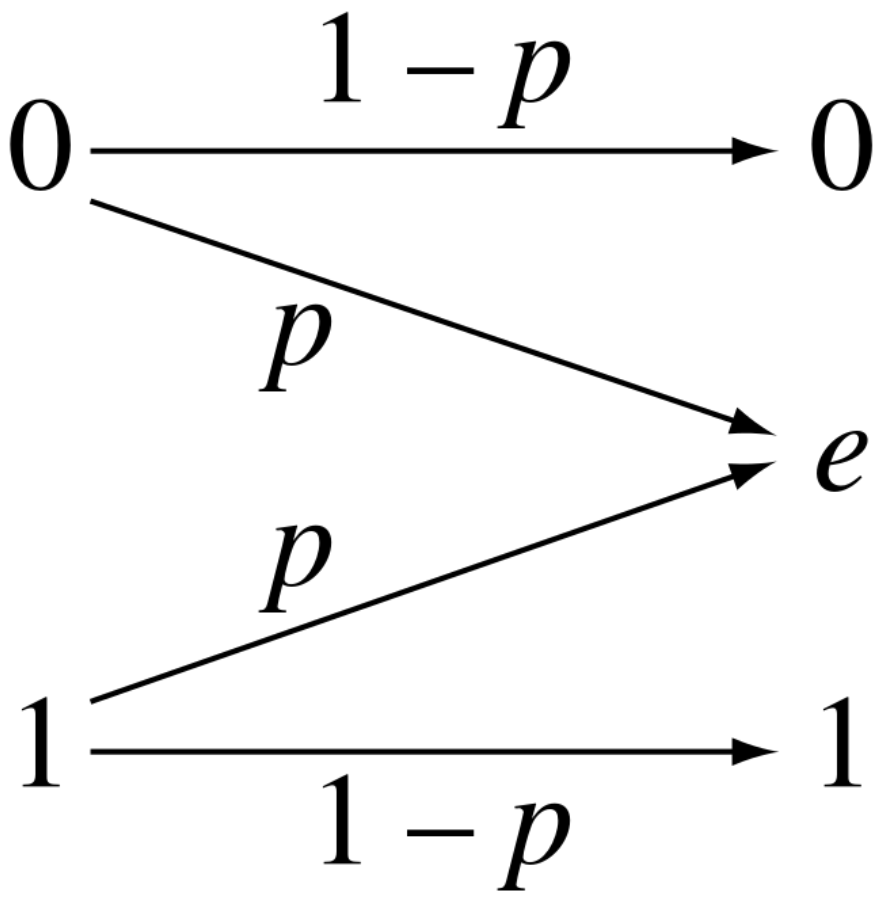
Encoder


00
00
a
11
11
Output
branch word
00
10
b
c
01
Encoder
state
10
01
d
01
11
Input bit 0
Input bit 1
(b)
10

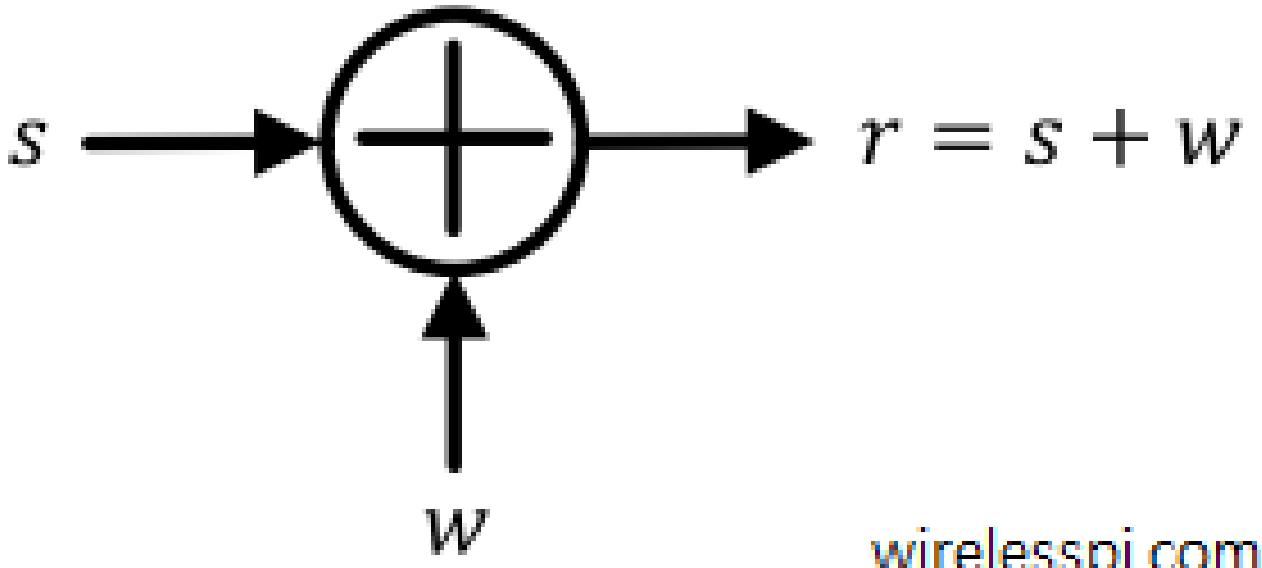
BSC Channel



BEC Channel



Gaussian Channel



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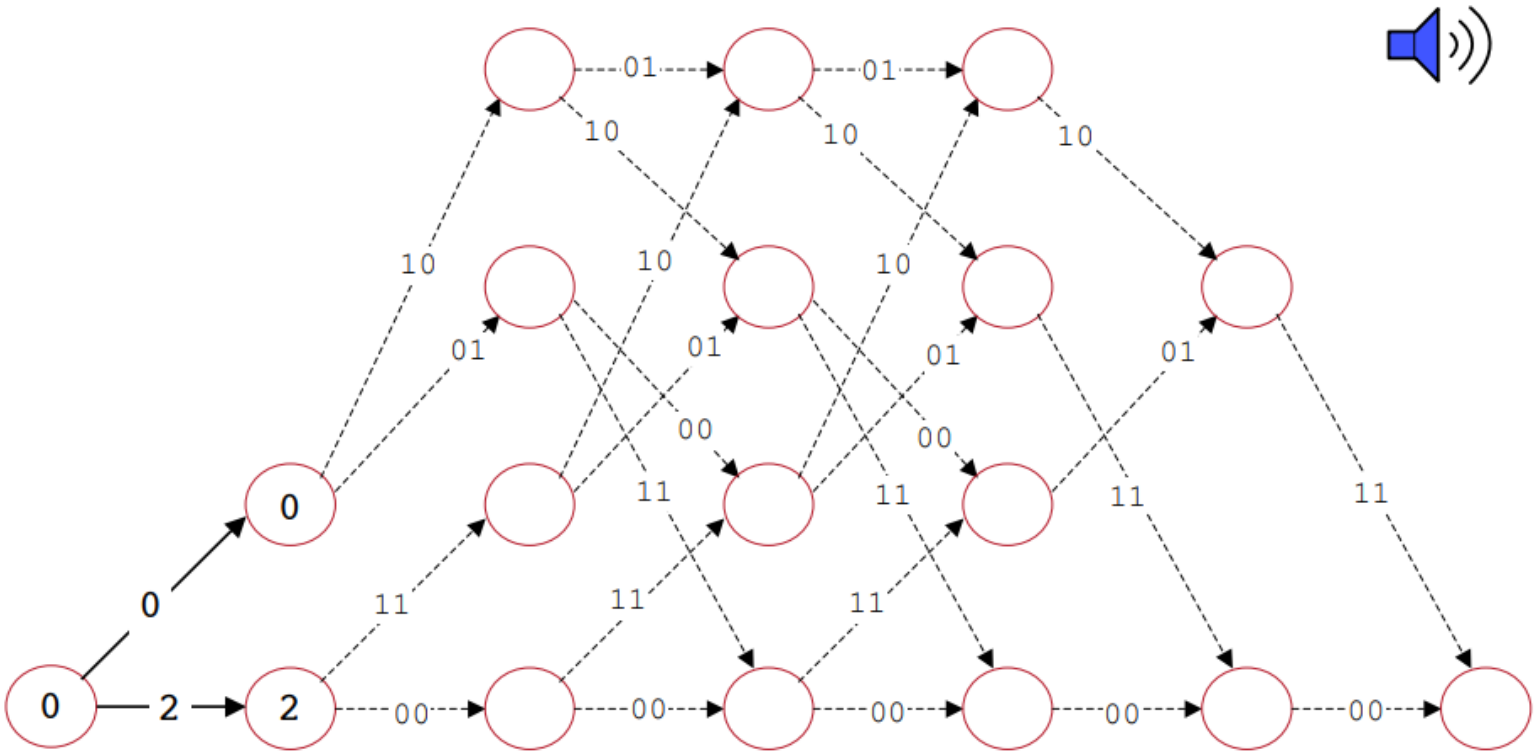
Decoder

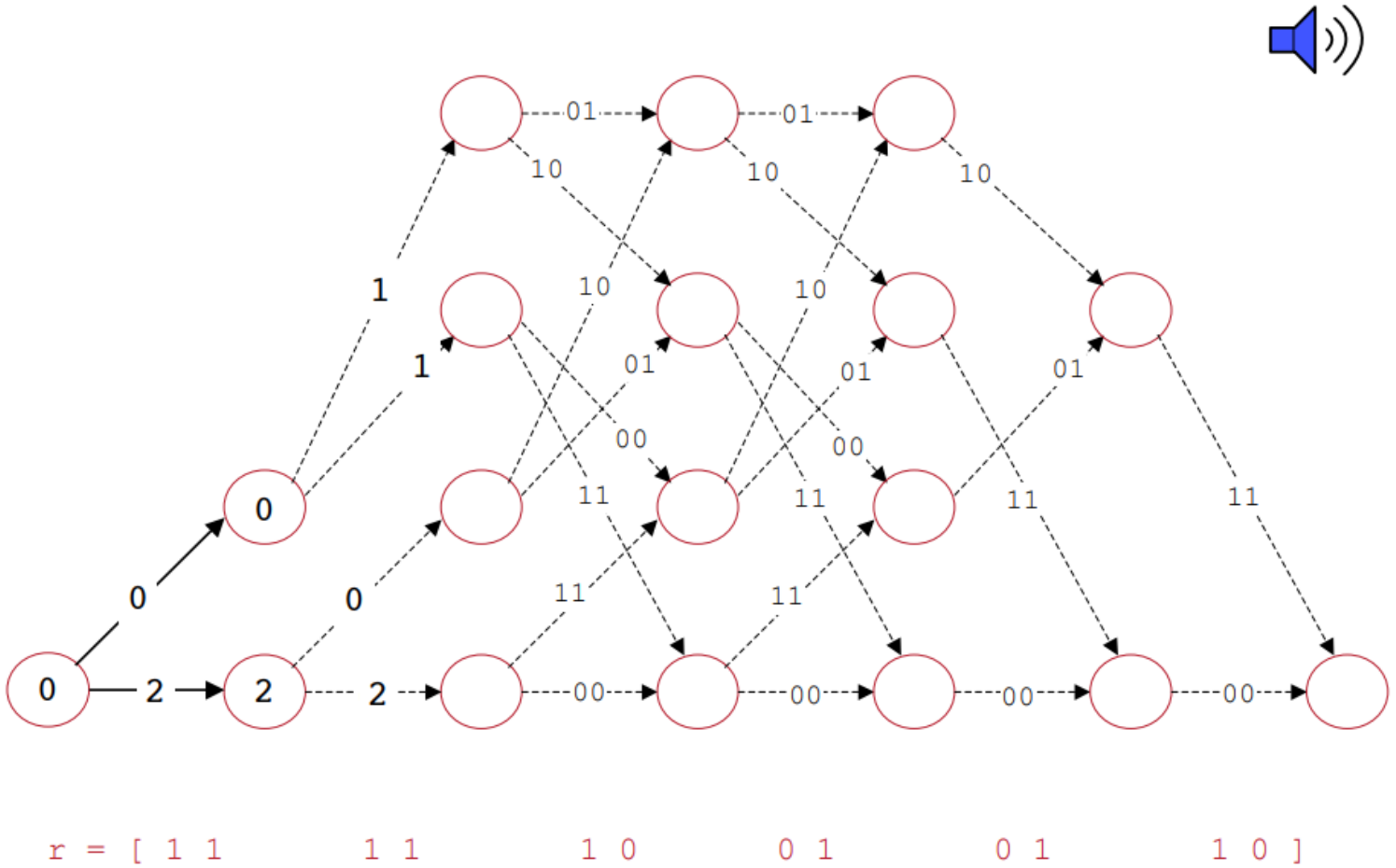
- In decoder part we have 2 metrices Branch and Path metrics.
- The Trellis has eight branches connecting the four states at bit index i to the four states at bit index i + 1. The branch metric of each branch is calculated as the distance between the channel output and the branch output. This distance is the Hamming distance for the BEC and the BSC channels and it is the Euclidean distance for the Gaussian channel.
- The path metric computation may be thought of as an add-compare-select procedure:

1. Add the branch metric to the path metric for the old state.
2. Compare the sums for paths arriving at the new state (there are only two such paths to compare at each new state because there are only two incoming arcs from the previous column).
3. Select the path with the smallest value, breaking ties arbitrarily. This path corresponds to the one with fewest errors.

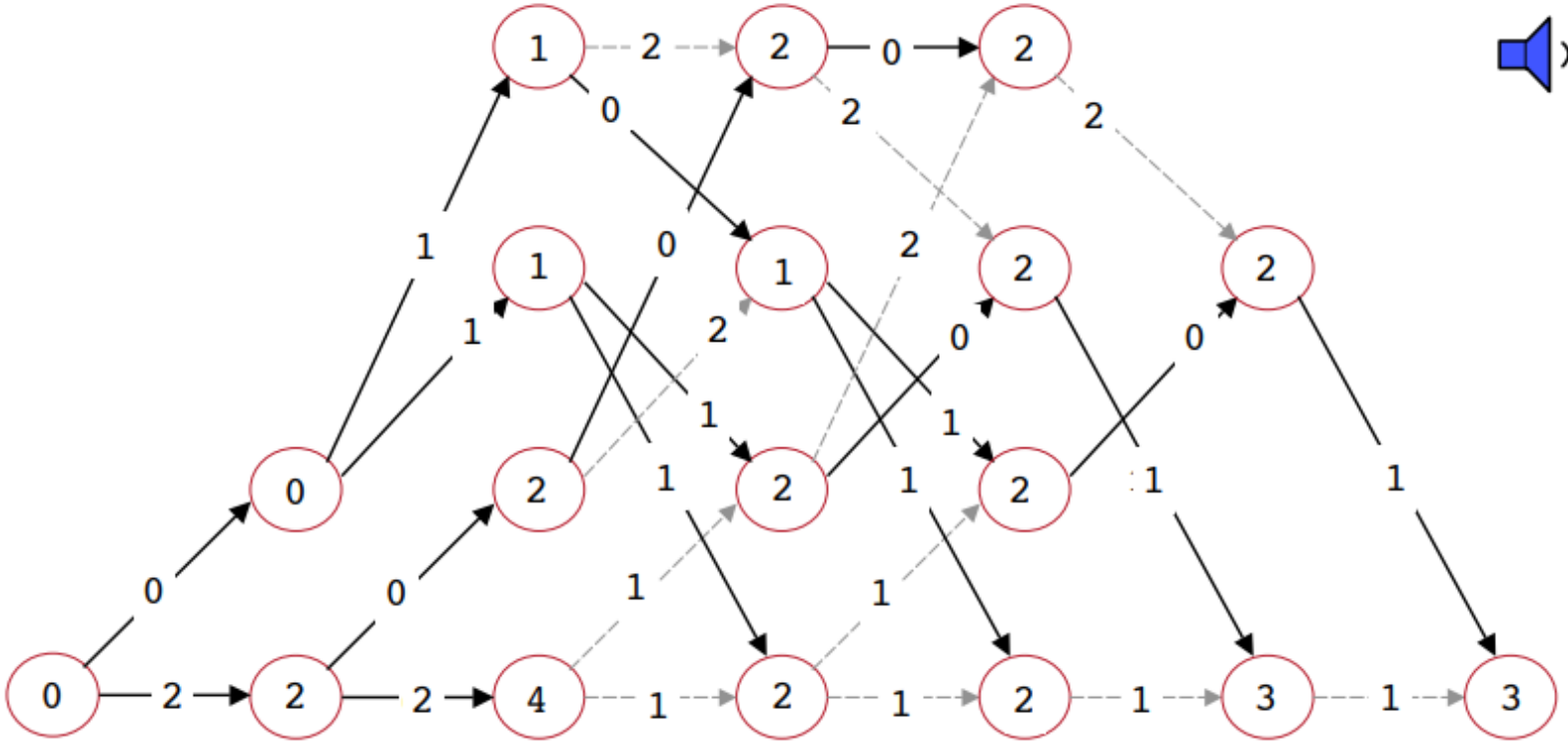
Decoder



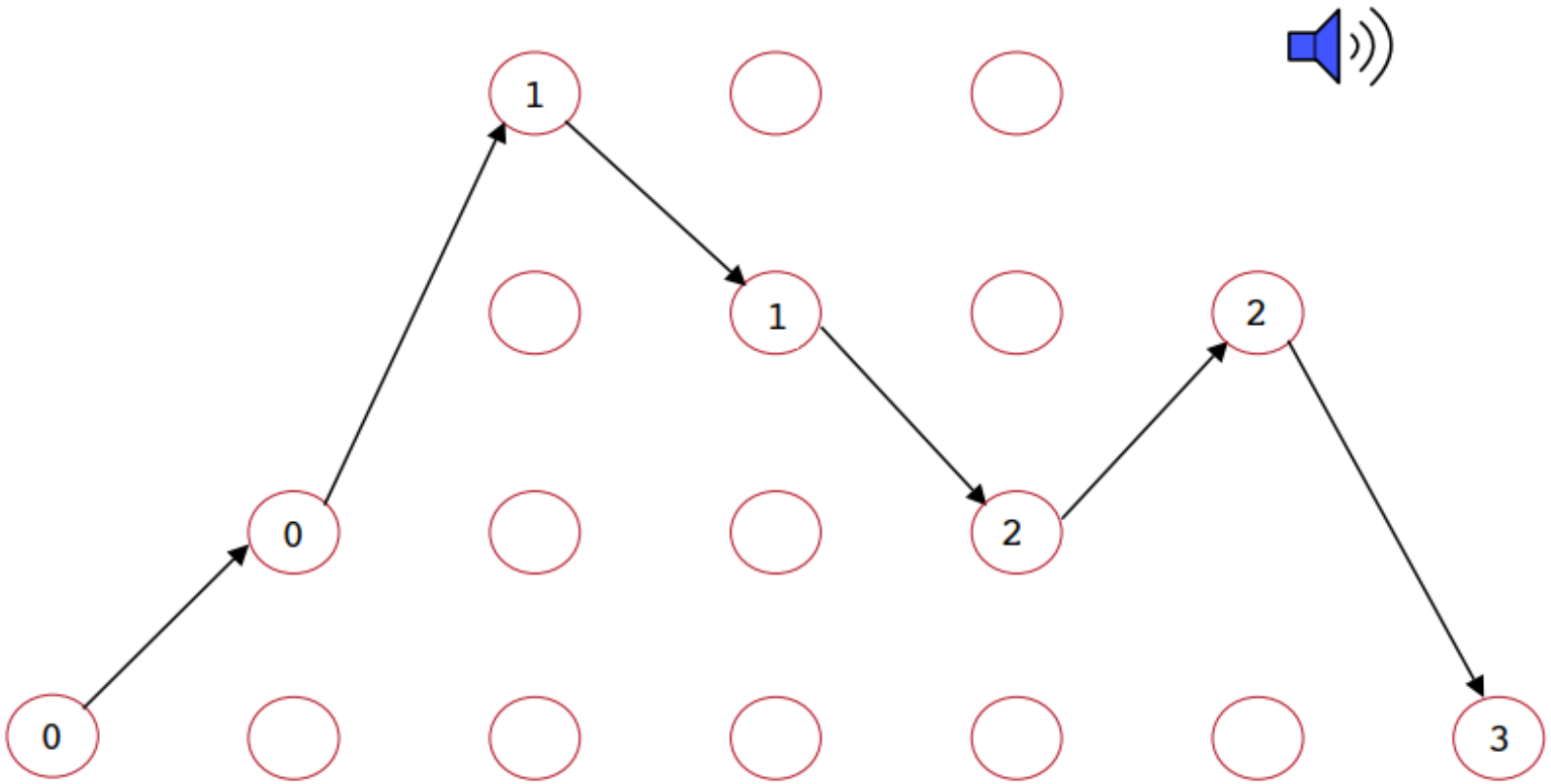
Decoder


01
01
10
10
10
1
10
10
1
01
01
01
00
00
11
11
11
11
0
0
0
0
2
2
2
11
11
00
00
00
00
r = [1 1 1 1 1 0 0 1 0 1 1 0]

Decoder

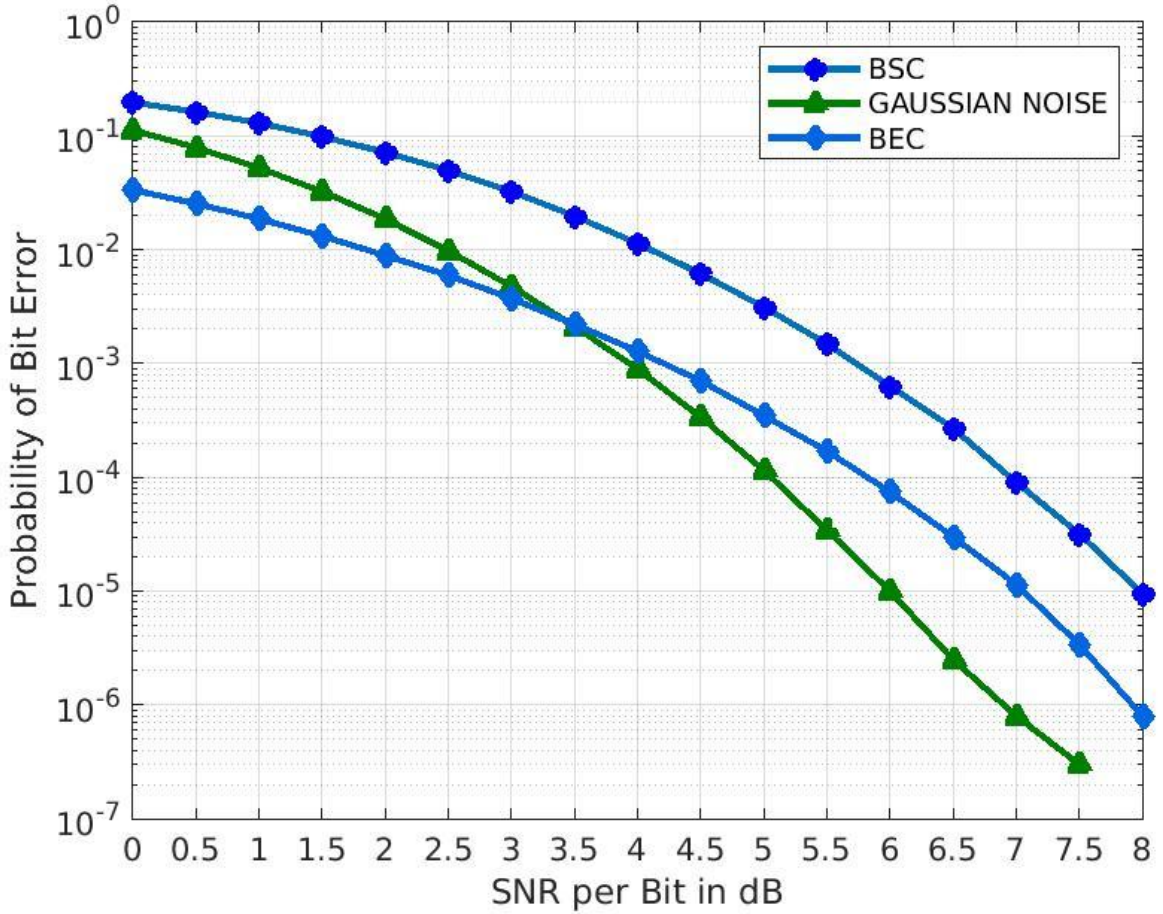


Decoder



r = [1 1 1 1 1 0 0 1 0 1 1 0]

Results


BSC
GAUSSIAN NOISE
BEC
Probability of Bit Error
SNR per Bit in dB
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-6
10^-7
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8

Thank You