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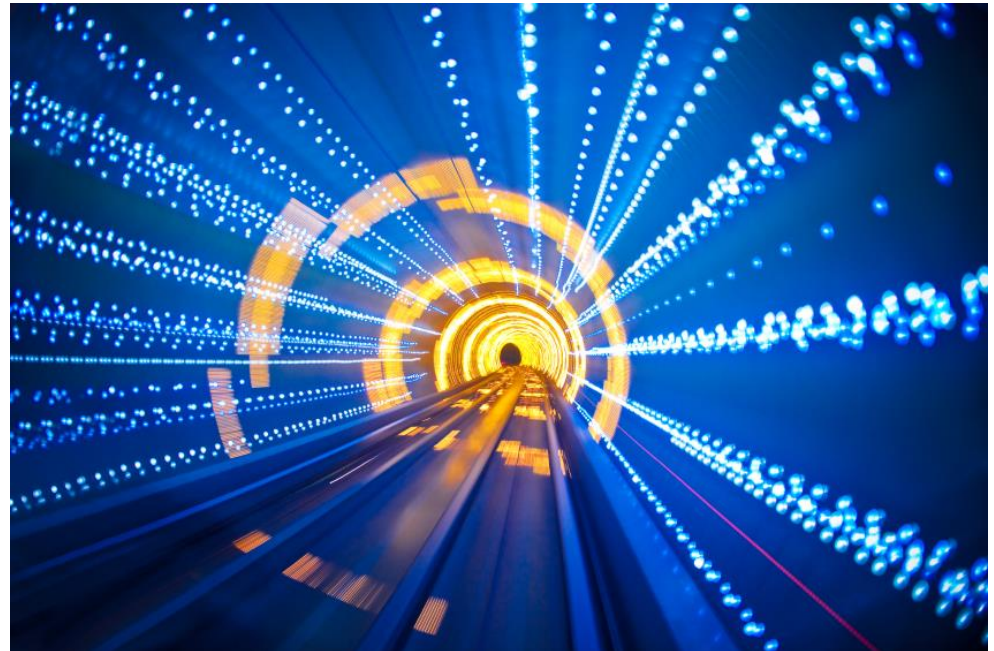
Design of DPSS based Fiber Bragg Gratings and Their Applications in All-Optical Encryption.

Contents

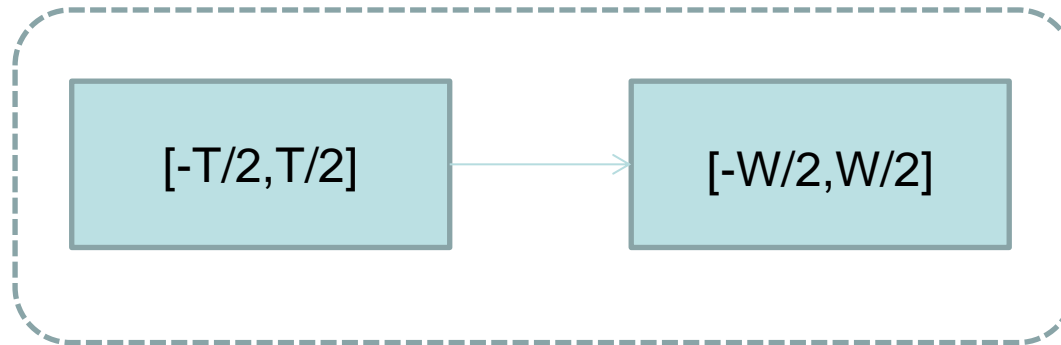
- Introduction
- Discrete Prolate Spheroidal Sequences (DPSS).
- Application of Discrete Layer Peeling Algorithm
- All-optical Encryption:
 - Encoder and decoder schemes.
 - Numerical results and performance curves.

Challenges of future optical networks

- Limited bandwidth,
- High power consumption,
- Heterogeneity, and
- Most important : Security.



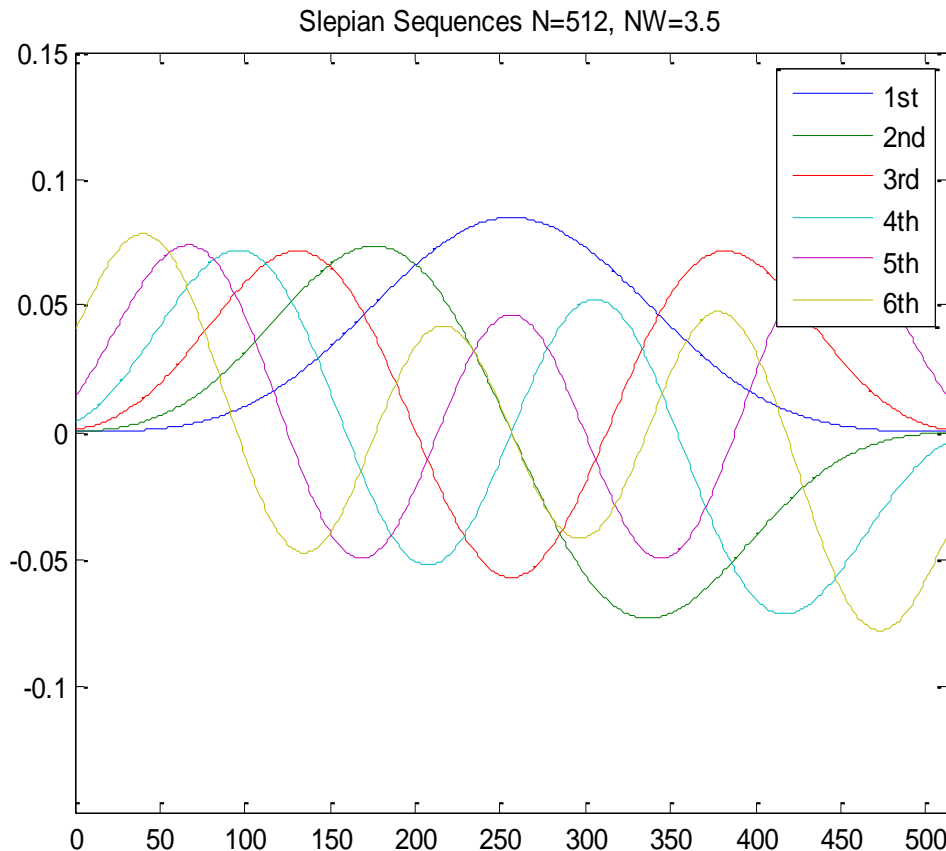
Discrete Prolate Spheroidal Sequences (DPSS) definition



- Eigen-functions of the system of time limiting operator followed by low-passing one.
- Real-valued solutions to

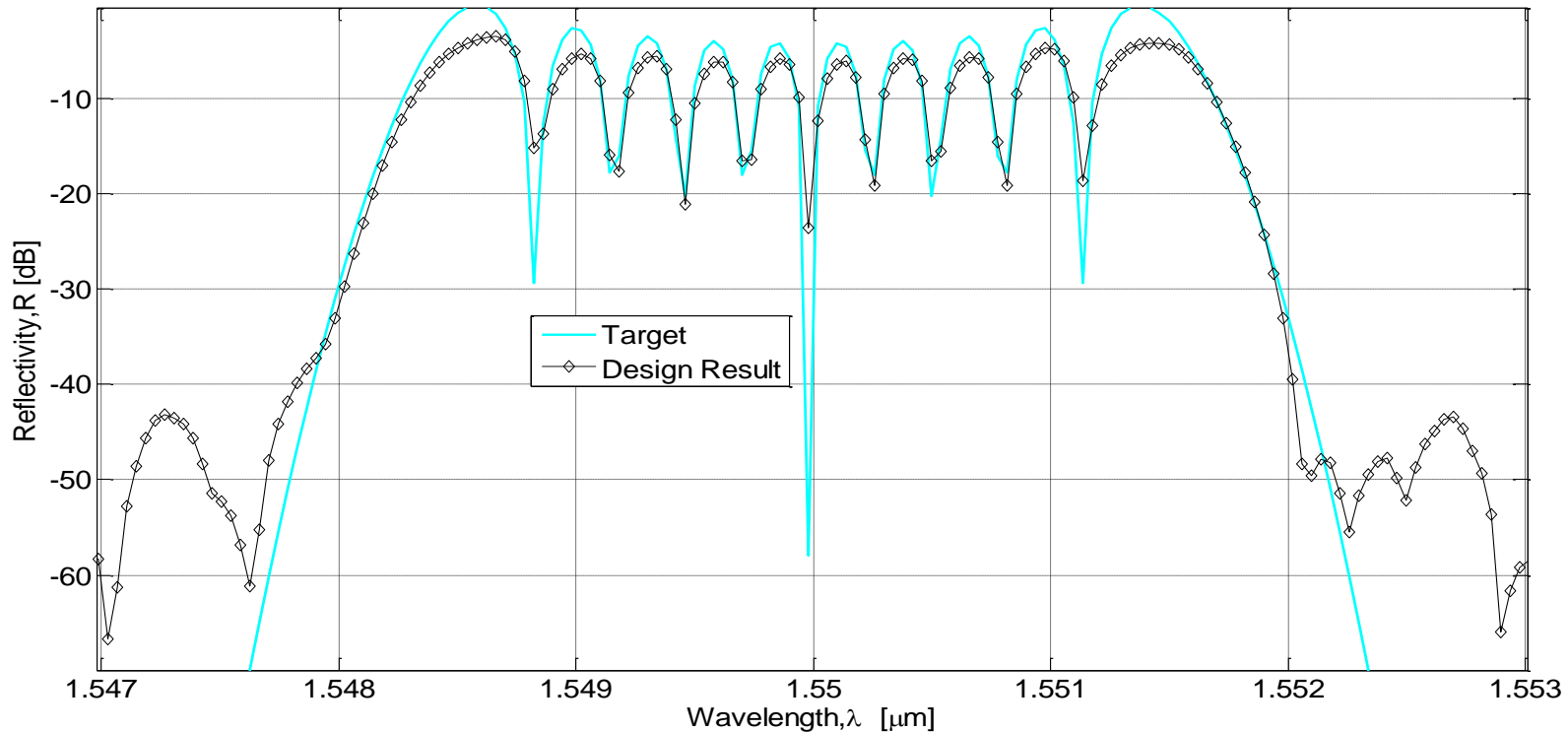
$$\sum_{i=0}^{N-1} \frac{\sin 2\pi W(n-i)}{\pi(n-i)} u_i^{(j)}(N, W) = \lambda_j(N, W) u_n^{(j)}(N, W)$$

Discrete Prolate Spheroidal Sequences (DPSS) properties



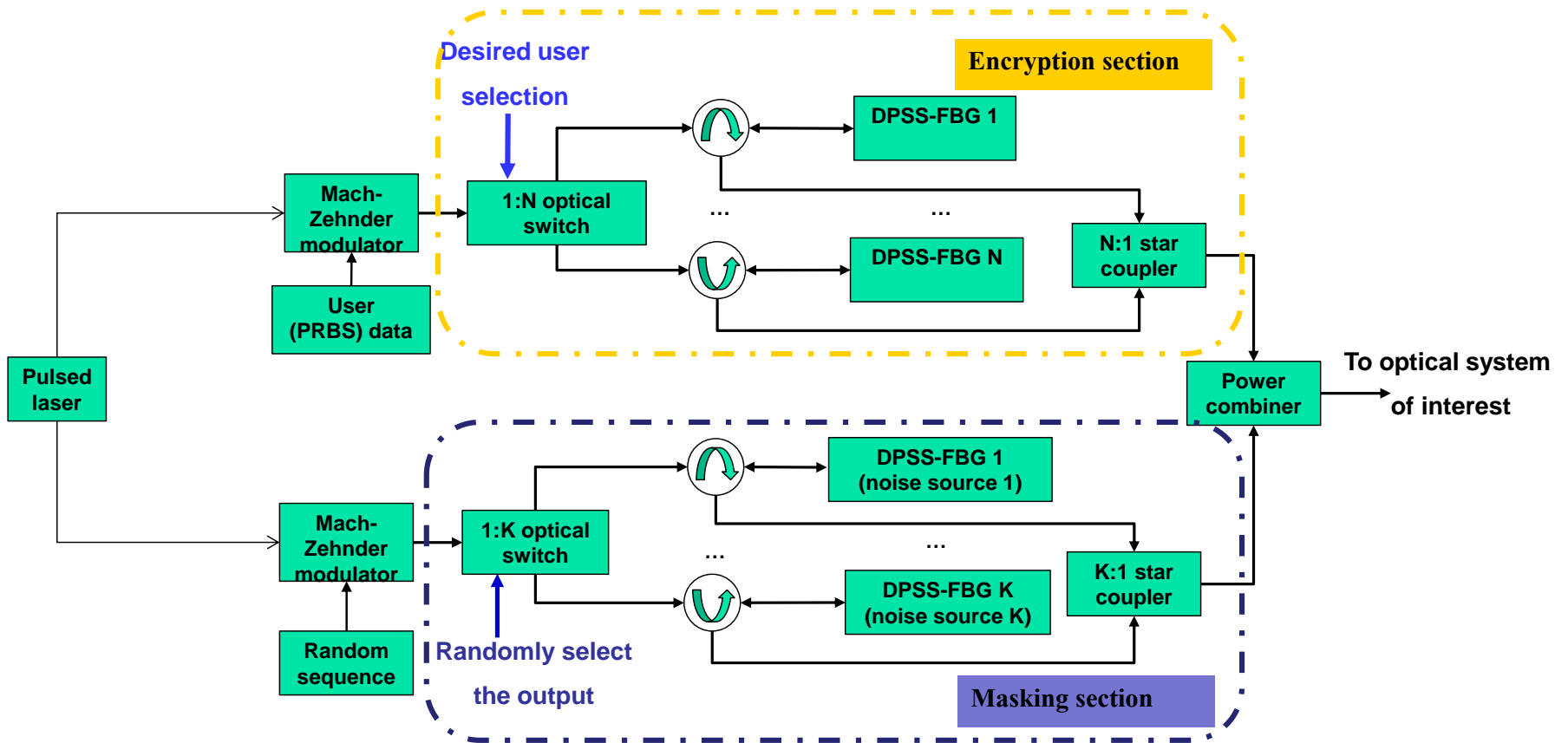
- Double orthogonality
- Energy concentration
- Symmetry

Application of Discrete Layer Peeling Algorithm



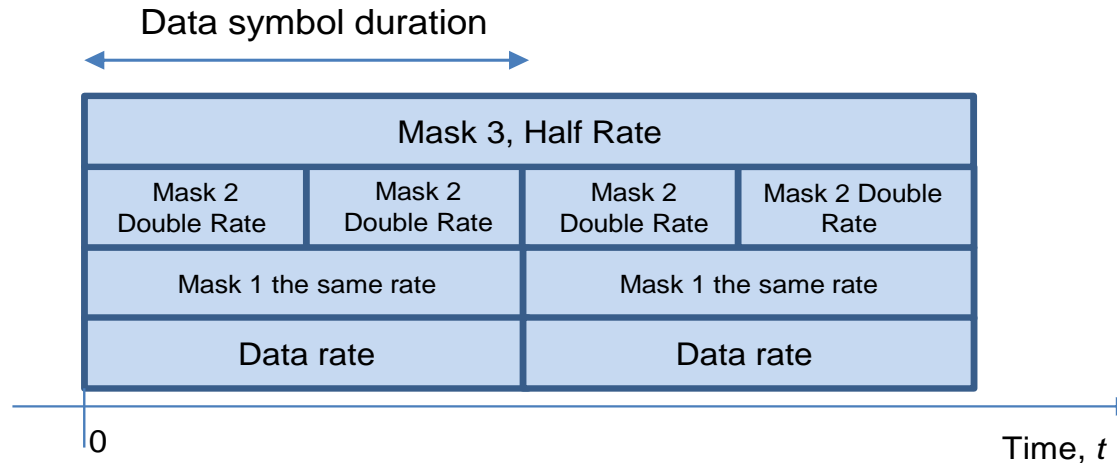
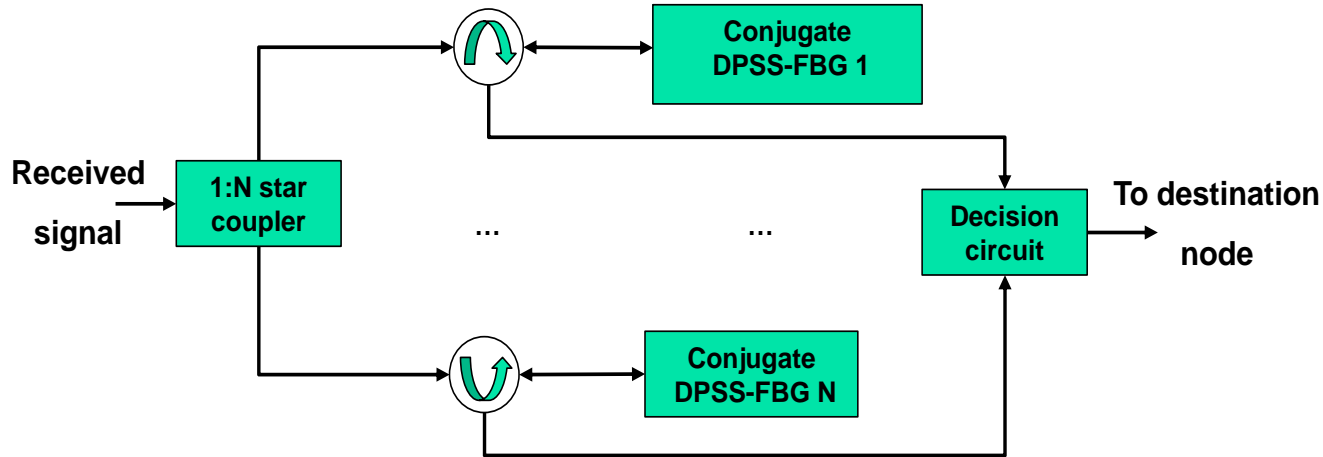
Spectra of the target transfer function and that obtained by the layer peeling algorithm for the 10-th order DPSS

All-optical Encryption Encoder scheme



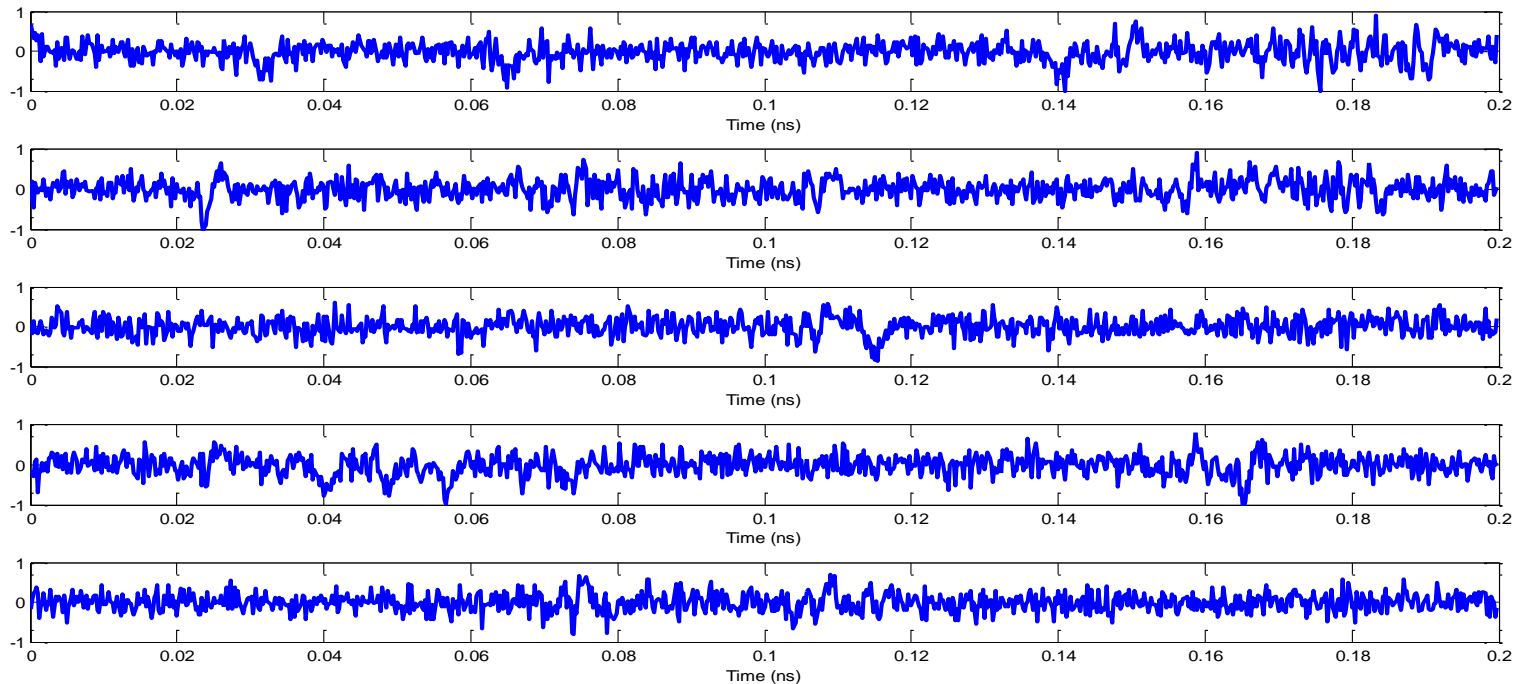
All-optical Encryption

Decoder scheme, different masking rates



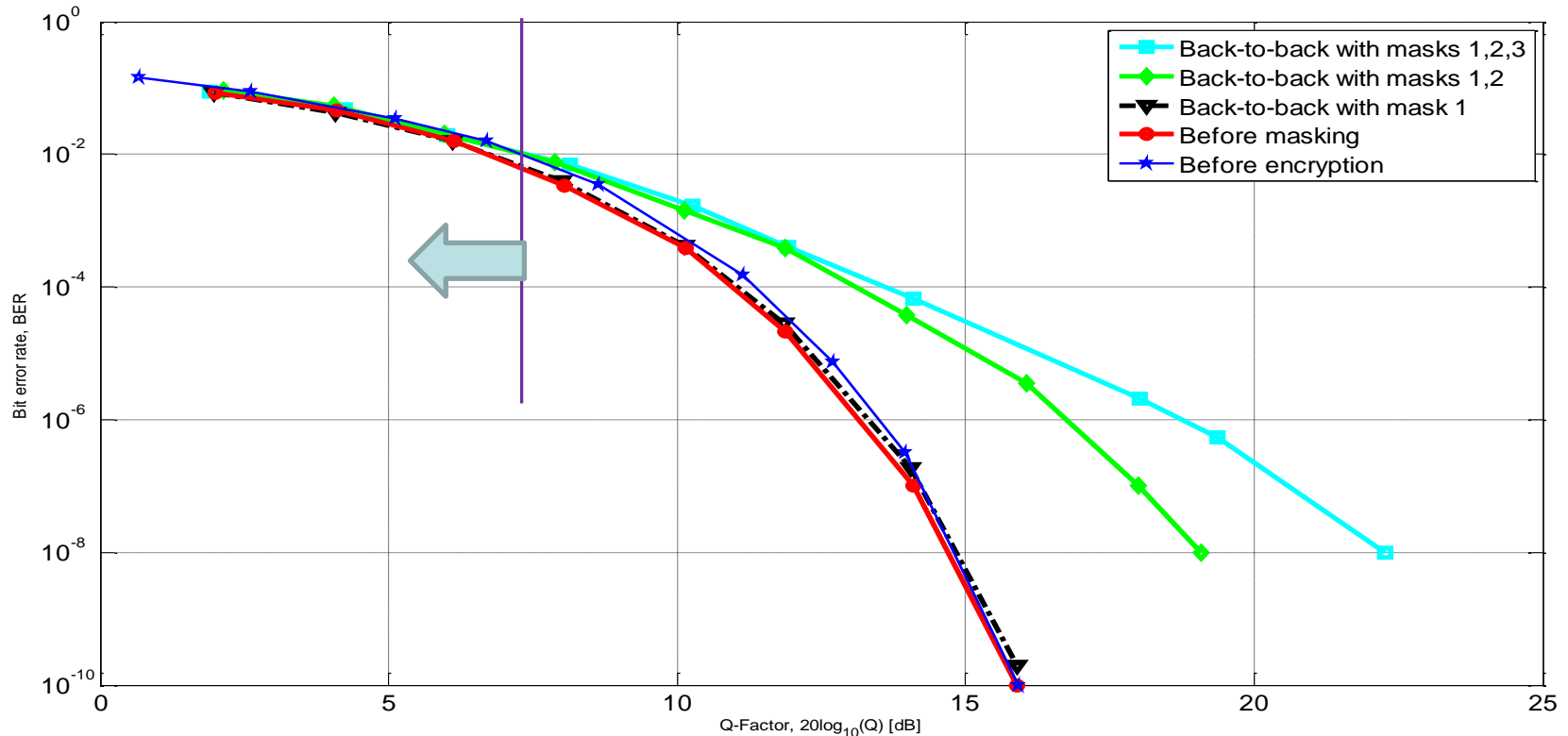
All-optical Encryption

Noise-like encoder output



Output of the encoder at different time intervals while maintaining same sequence of 010101...

All-optical Encryption Performance BER curves



BER performance of the proposed encryption system with 1,2
and 3 masks of rates different from transmitted sequence
data rate (10 Gb/s)

Thank you for your attention

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