Assisted Guessing Random Additive Noise Decoding

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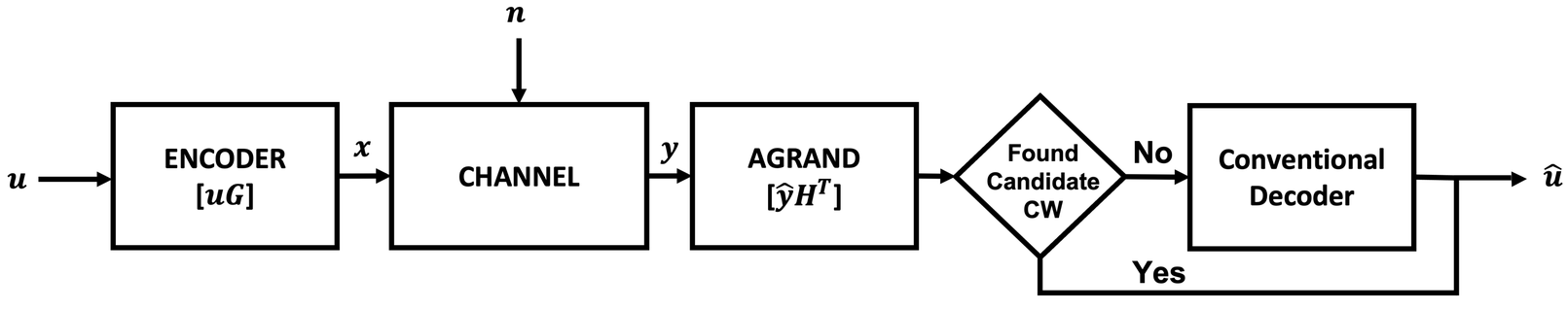
ASSISTING TRADITIONAL DECODERS

- Assisting SCL decoder for CA-Polar (105+11,128) to reduce latency.
- If the GRAND module fails, the the conventional decoder is used.

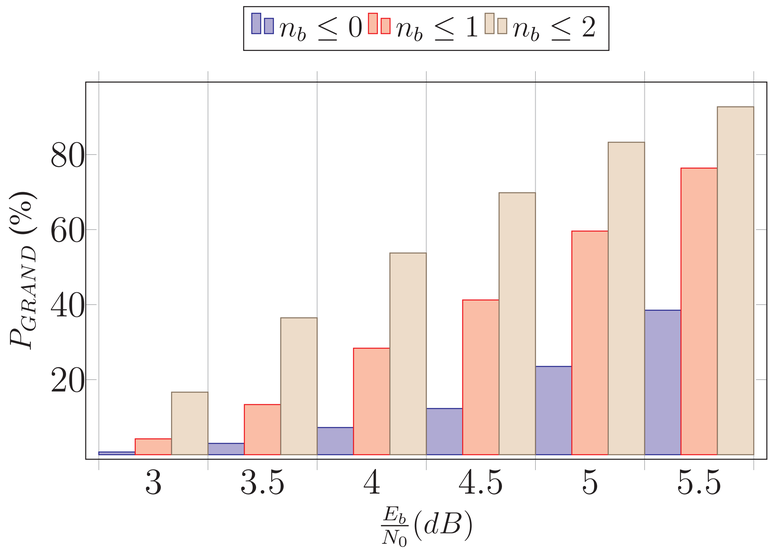
LATENCY OF THE DECODING MODULES

- Latency of GRAND Module: $\mathbf{2} + \lfloor \frac{\mathbf{n}}{\mathbf{2}} \rfloor$ clock cycles. [2]
- Latency of SCL decoder : $\mathbf{369}$ clock cycles [1]

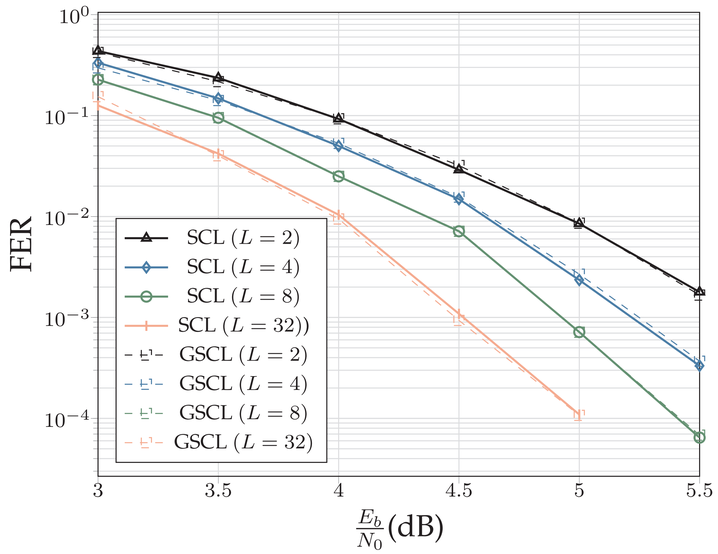
USING AGRAND TO REDUCE LATENCY



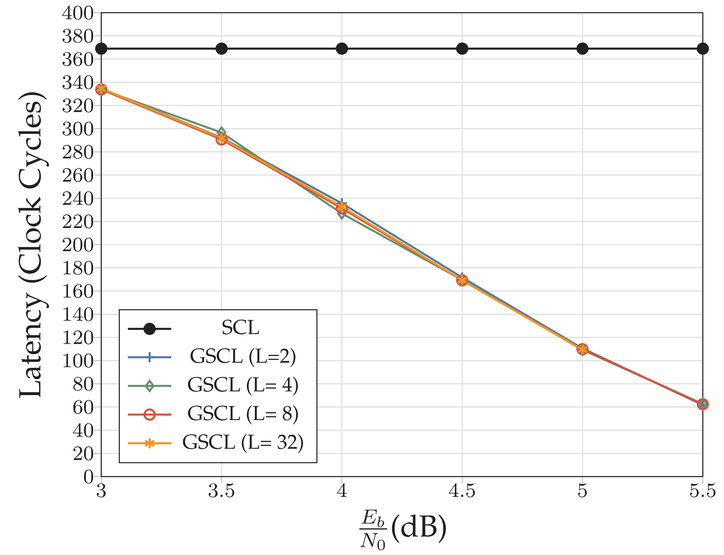
PERCENTAGE DECODED BY GRAND



PERFORMANCE EVALUATION



LATENCY EVALUATION



FOR CA-POLAR (105+11,128) AT $\frac{E_b}{N_0} = 5.5$

Average Latency Per Frame ↓ by 83.7%

No degradation in the FER performance

97% of frames only use GRAND decoder

REFERENCES

[1] Balatsoukas-Stimming et al. "Hardware architecture for list successive cancellation decoding of polar codes," IEEE TCS II, Aug. 2014

[2] S. M. Abbas, T. Tonnellier, F. Ercan, and W. J. Gross, "High-throughput VLSI architecture for GRAND," 2020 IEEE SiPS, 2020.