

# Experimental Validation of Symbol Error Histogram Extrapolation

## -Supporting Comments #226 and #296

Roberto Rodes, Coherent

802.3dj interim

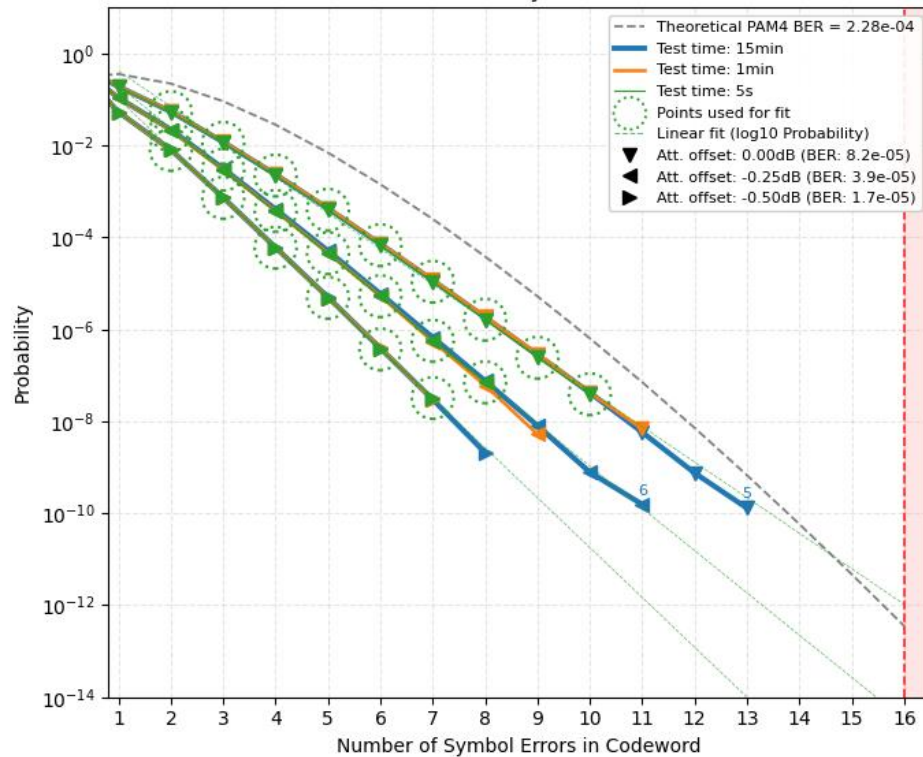
May 2026 Munich Germany

# Introduction

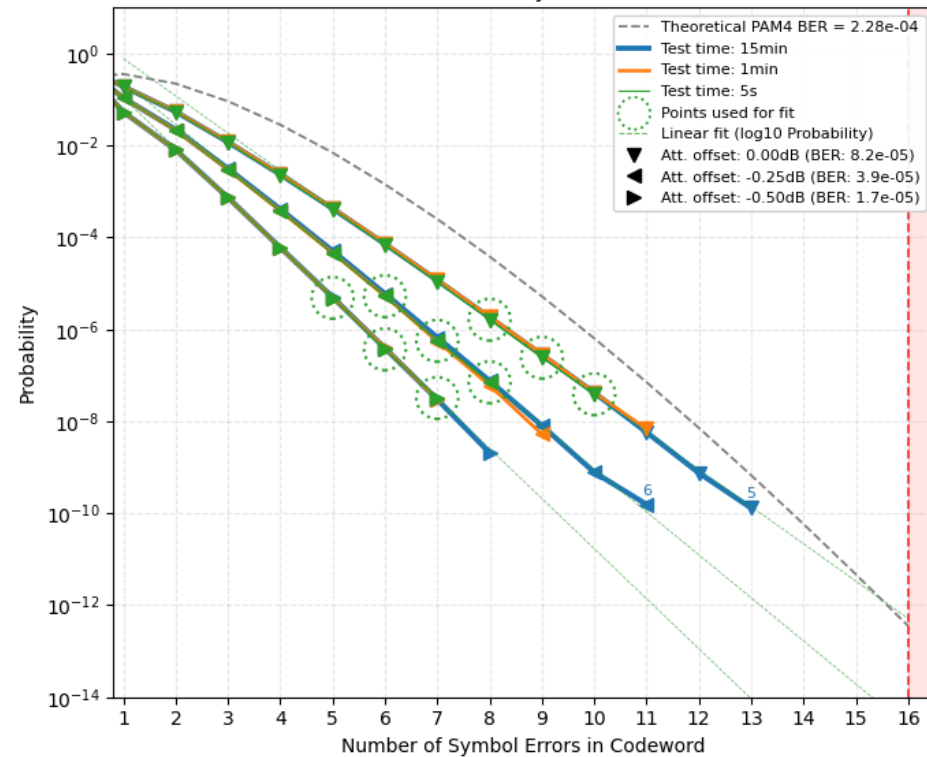
- This presentation bring some experimental justification for the proposal in Maniloff\_3dj\_01\_2605

# Extrapolation: All vs Higher Bins- Case A (Good)

Fitting with all bins >1



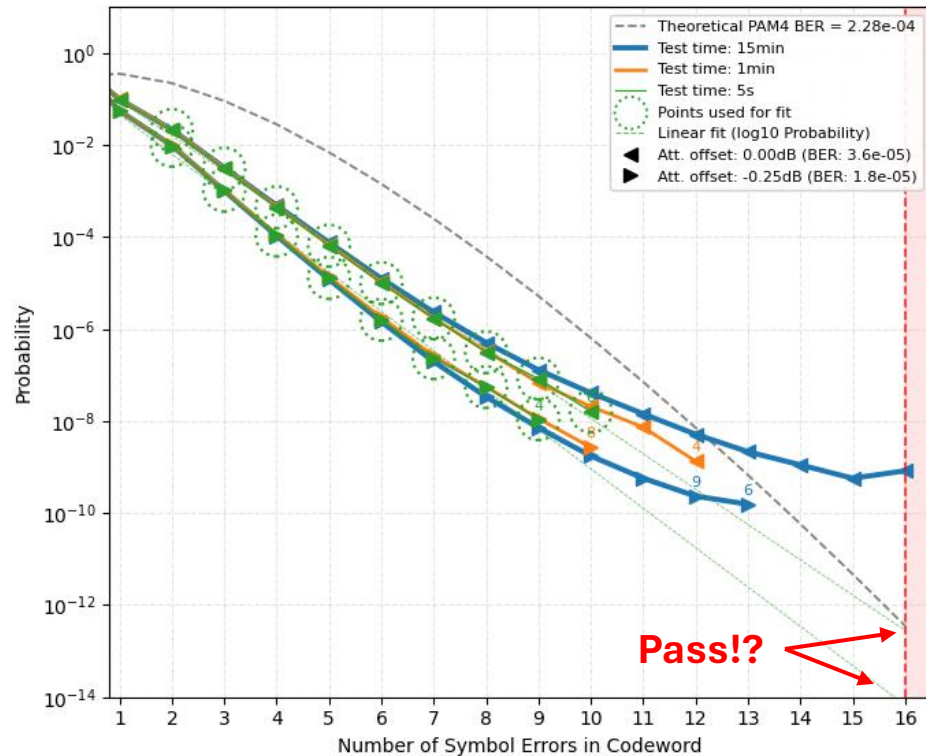
Fitting only with higher bins



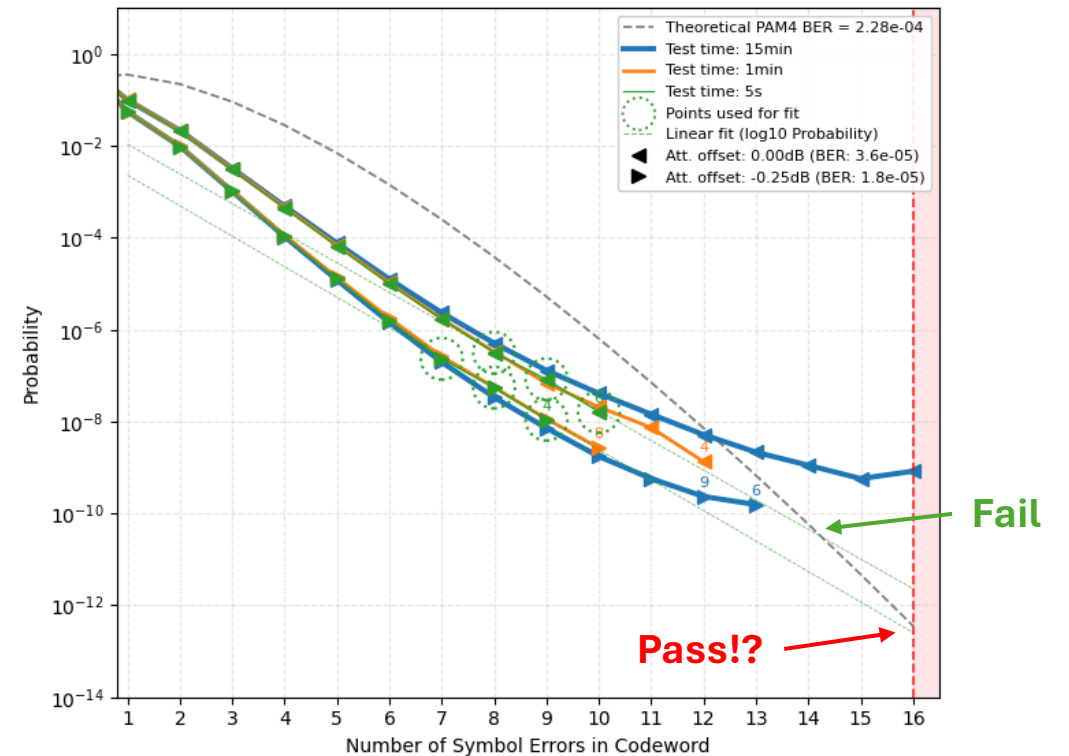
In Symbol Error Distributions with good linear fit, measuring higher bins vs all bins results in small/marginal improvement in the extrapolation

# Extrapolation: All vs Higher Bins- Case B (Bad)

Fitting with all bins >1



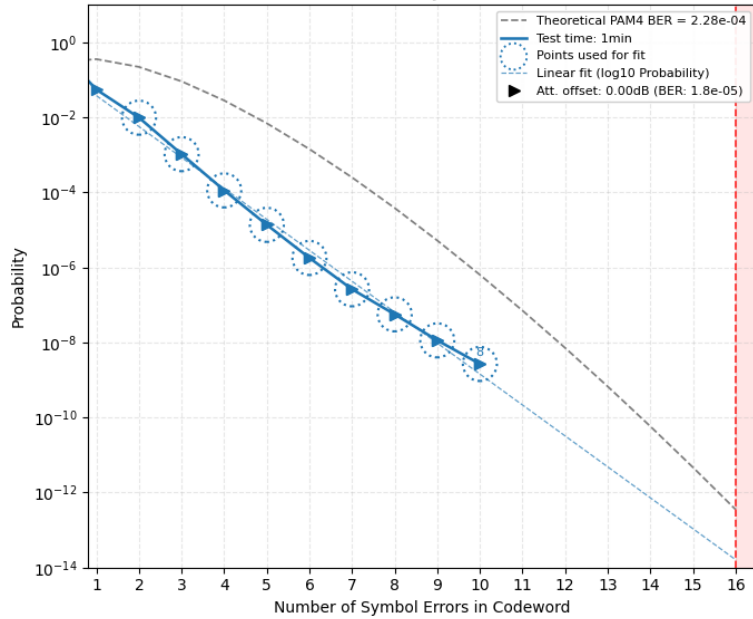
Fitting only with higher bins



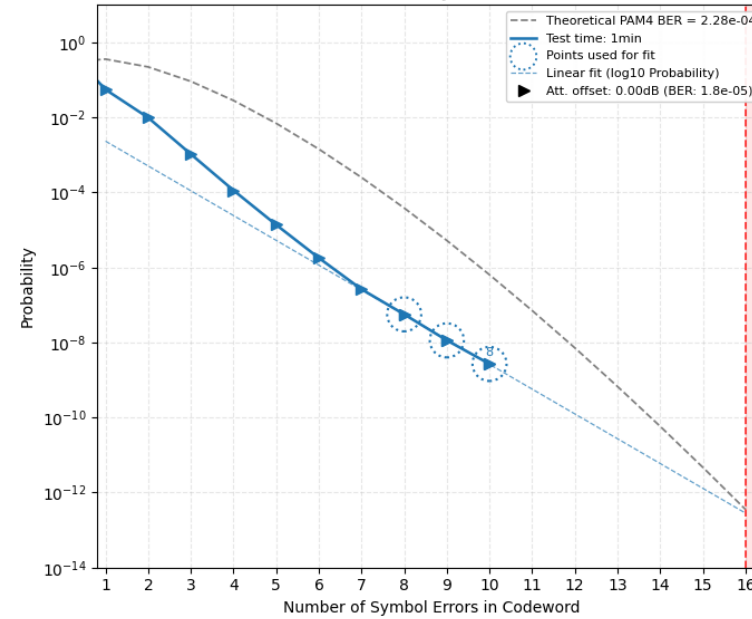
Extrapolation based on higher bins is a clear improvement when dealing with correlated errors, but it might not be enough to flag failing tests.

# Additional Guidance to Flag bad performance

## Current extrapolation

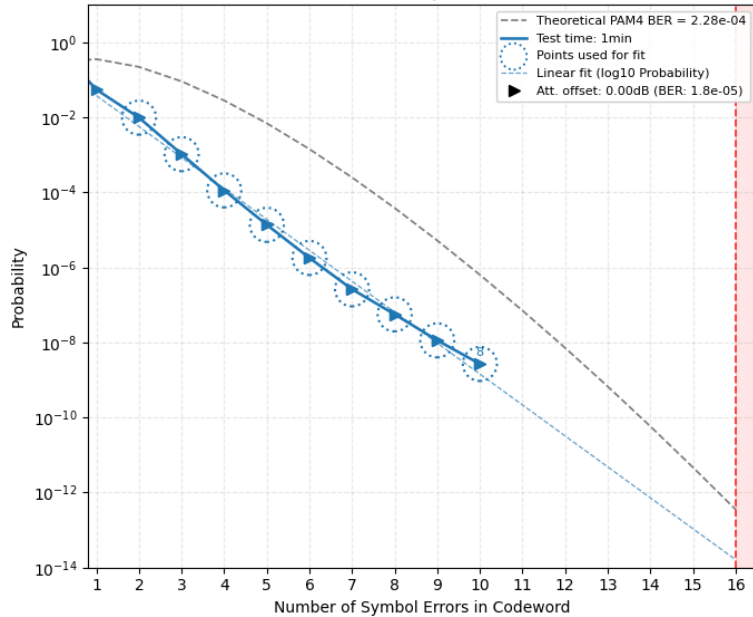


## Improved extrapolation

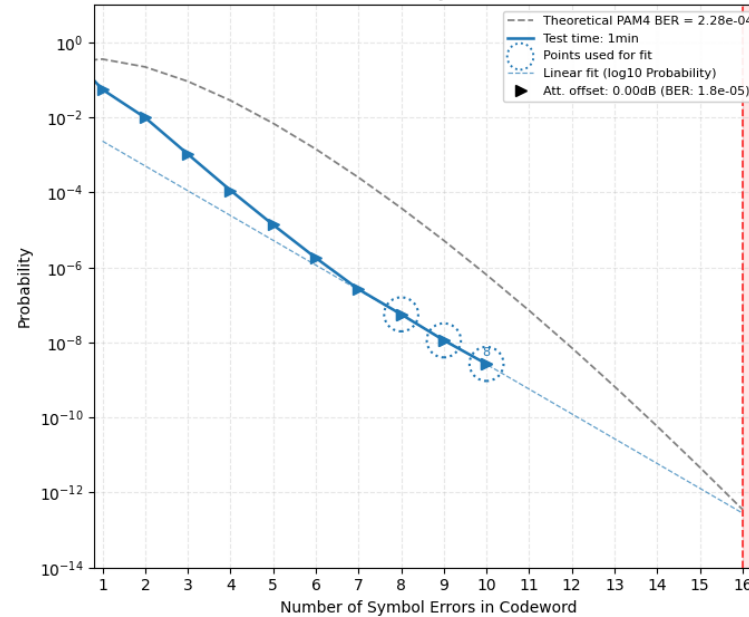


# Additional Guidance to Flag bad performance

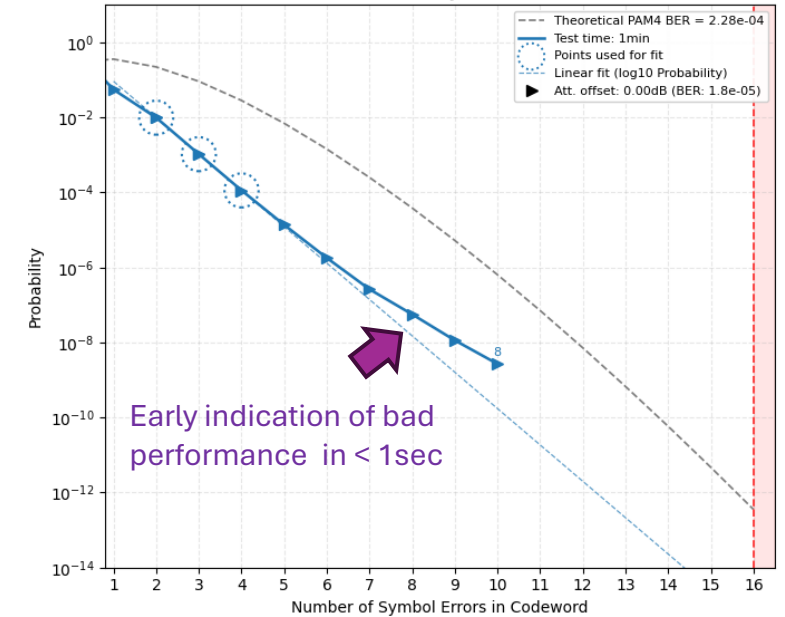
## Current extrapolation



## Improved extrapolation



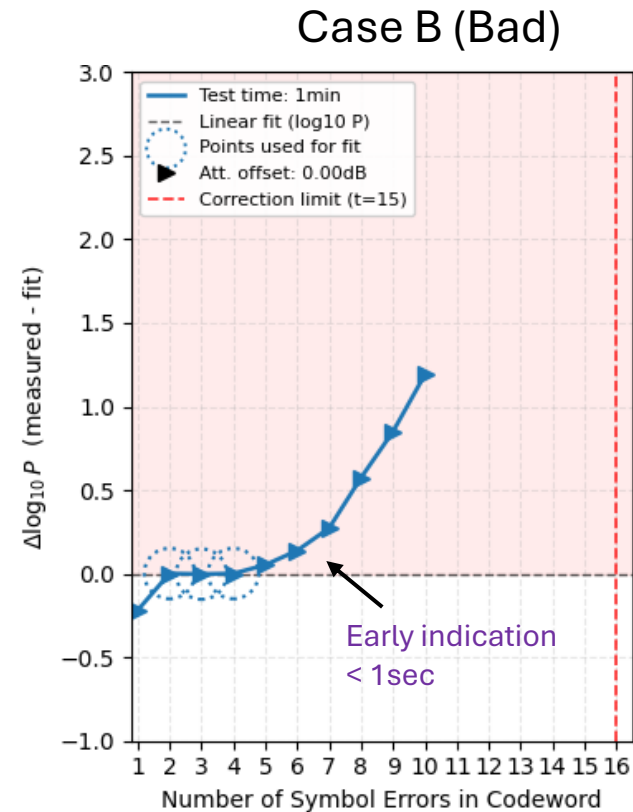
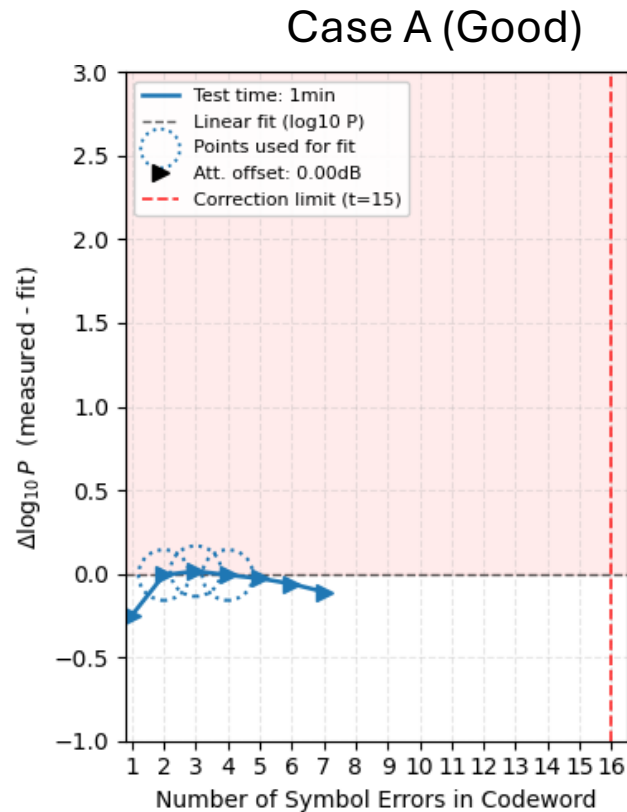
## Additional guidance based on slope reduction



[maniloff\\_3dj\\_01\\_2605](#)

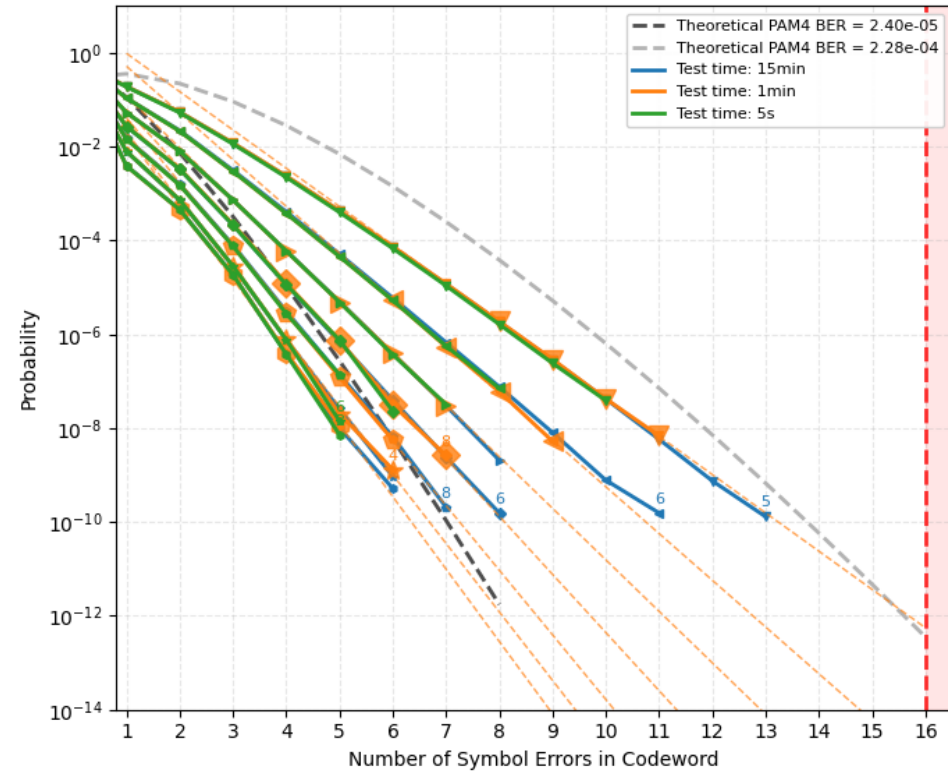
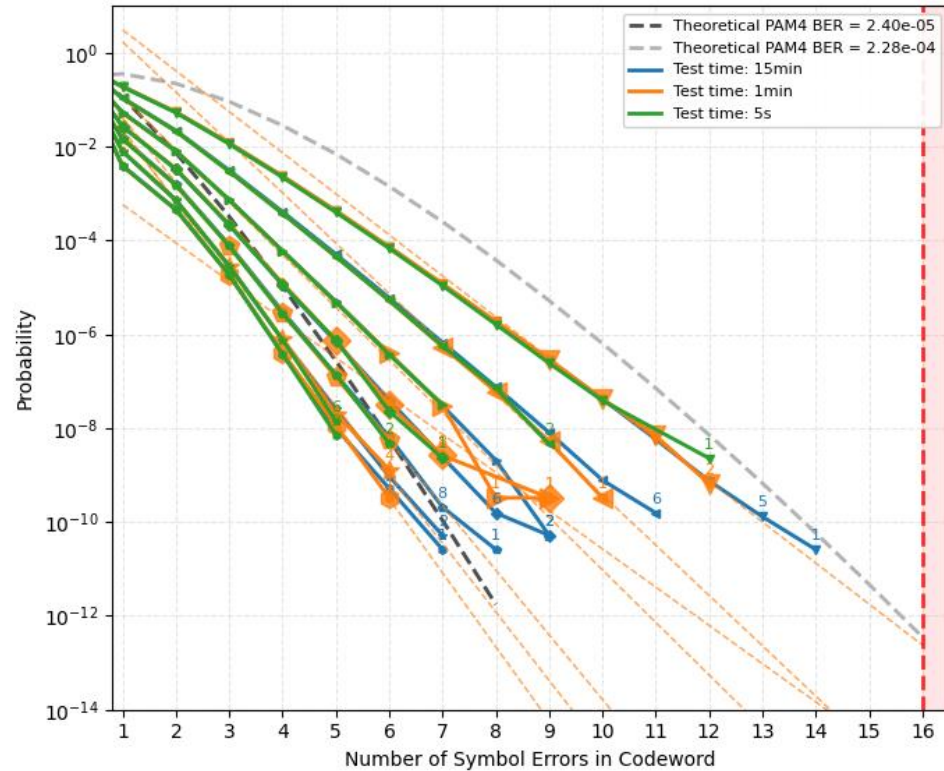
*“If the slope of the histogram over the measured bins is increasing, it can be an indication of not meeting the BLER requirement. To verify that the slope is not increasing, the values of  $(\log_{10}(Hm(k)) - \log_{10}(Hm(4)))/(k-4)$  should be less than  $(\log_{10}(Hm(4)) - \log_{10}(Hm(2)))/2$  for  $k$  greater than 4.”*

# Offset to Linear Fit comparison



Clear early indication of potential failure can be seen from middle bins with very short tests

# Extrapolation vs Lower count bins



Including bins with lower counts can distort the linear fitting and extrapolation

# Conclusion

- Extrapolation is required to estimate Rx sensitivity, as directly measuring  $\geq 16$  symbol errors per block is impractical.
- Given its complexity, the standard should include guidance to ensure consistency and avoid unintentionally passing failing parts.
- Using higher histogram bins and confirming a decreasing slope improves confidence in meeting Rx sensitivity requirements.