Enhancing Margin Analysis through Dynamic Dashboards: A Case Study on High-Speed SERDES Link using Power BI and Snowflake

Abstract –
Electrical validation of High-Speed IO (HSIO) links is crucial for ensuring optimal performance and reliability in modern electronic systems. Conventional methods for analyzing Electrical Validation data typically involve extracting data from cloud data platforms and conducting offline analysis with various tools such as Excel, MATLAB, JMP. These methods offer flexibility for exploratory investigation yet suffer from significant drawbacks such as the lack of real-time analysis, data synchronization issues, performance bottlenecks and diminished efficiency.
The proposed study introduces a cloud-based business intelligence (BI) solution with direct integration to cloud data platforms for real time Electrical Validation (EV) data analysis with relationship between various data tables that highlight their effectiveness in identifying potential issues and ensuring compliance with industry standards. This work demonstrates real-time visualization and analytics in PowerBI by integrating data from Snowflake and create relationship with numerous databases, including HSIO margining data and databases containing Device Parametric data and Production Test Data. This comprehensive technique facilitates the connection of margining performance with diverse influencing factors, including but not limited to PCB vendor discrepancies, process variations, and socket-specific behaviors. Additionally, yield is calculated with the Empirical Cumulative Distribution Function (ECDF), promoting a comparative study among various link speeds, sockets, and ports. These findings suggest that while conventional techniques remain valuable, integrating advanced diagnostic tools can further enhance validation processes, leading to more robust HSIO link performance. This research provides insights into the evolution of electrical validation practices and proposes strategies for future improvements in HSIO link assessments.