Advantages of ECC-Free NAND in High Performance Applications

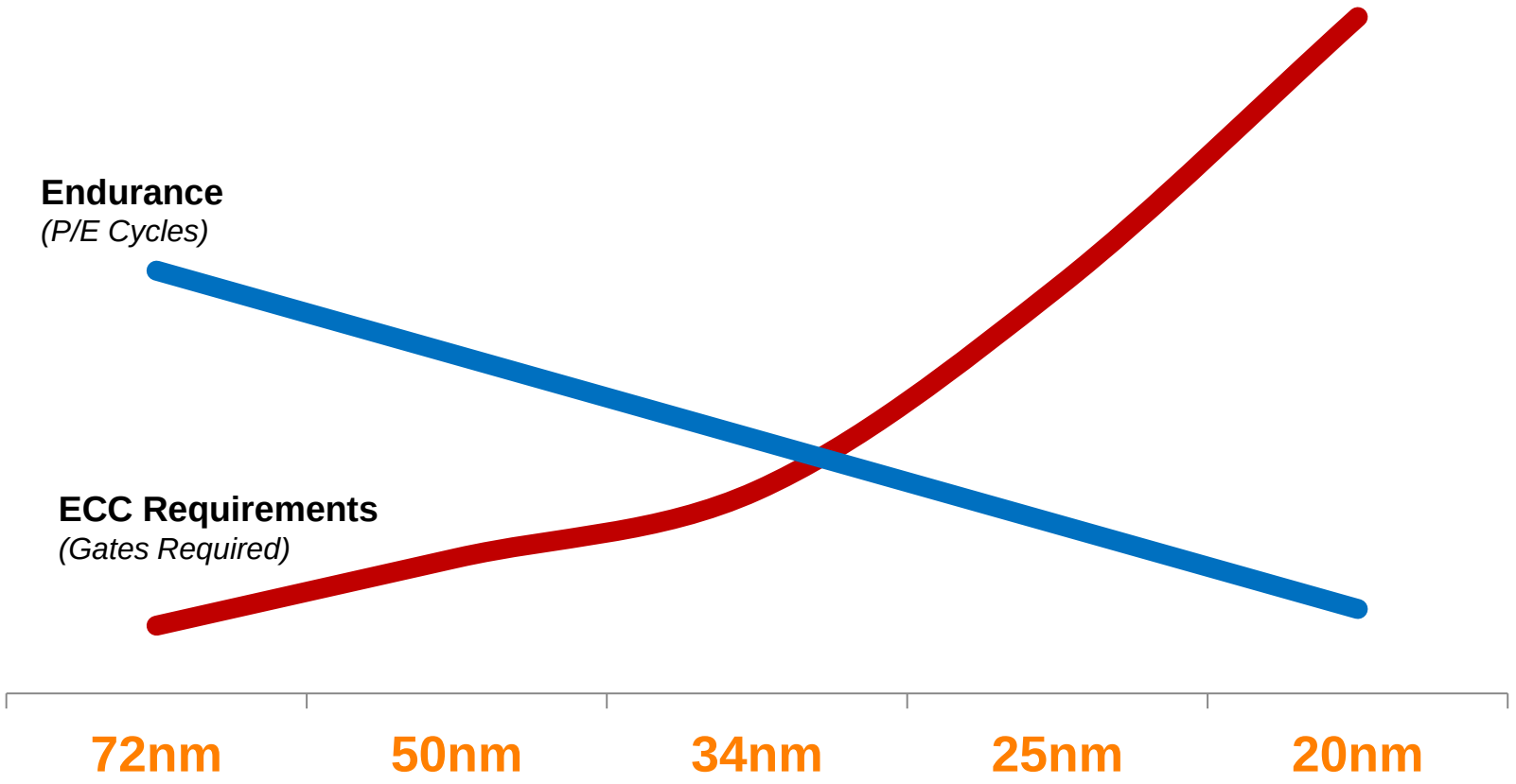
Richard Metzger

Micron Technology, Inc

Agenda

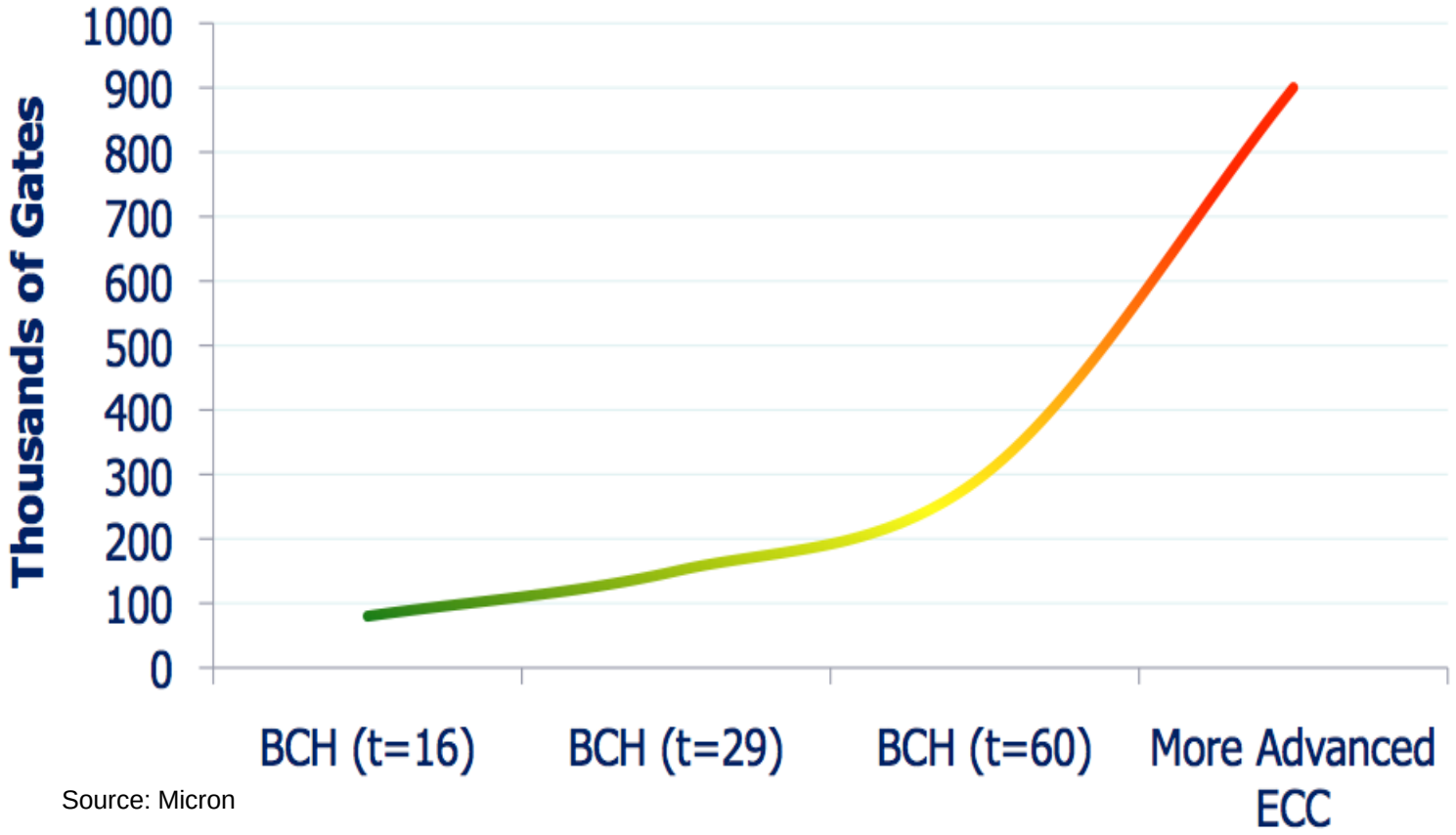
- NAND Challenges
- ECC Free Solution
- Benefits in FPGA Based Enterprise Applications
- Benefits in Other High Performance Applications

The Drawbacks of NAND Scaling



Source: Micron

The Drawbacks of NAND Scaling

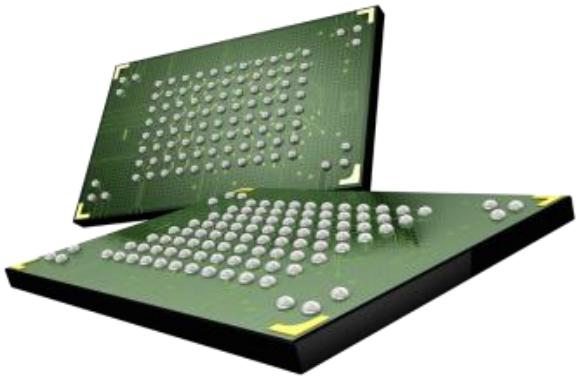


Source: Micron

***Increasing* RBERs requires <u>more ECC</u> to achieve *equivalent* UBERs**

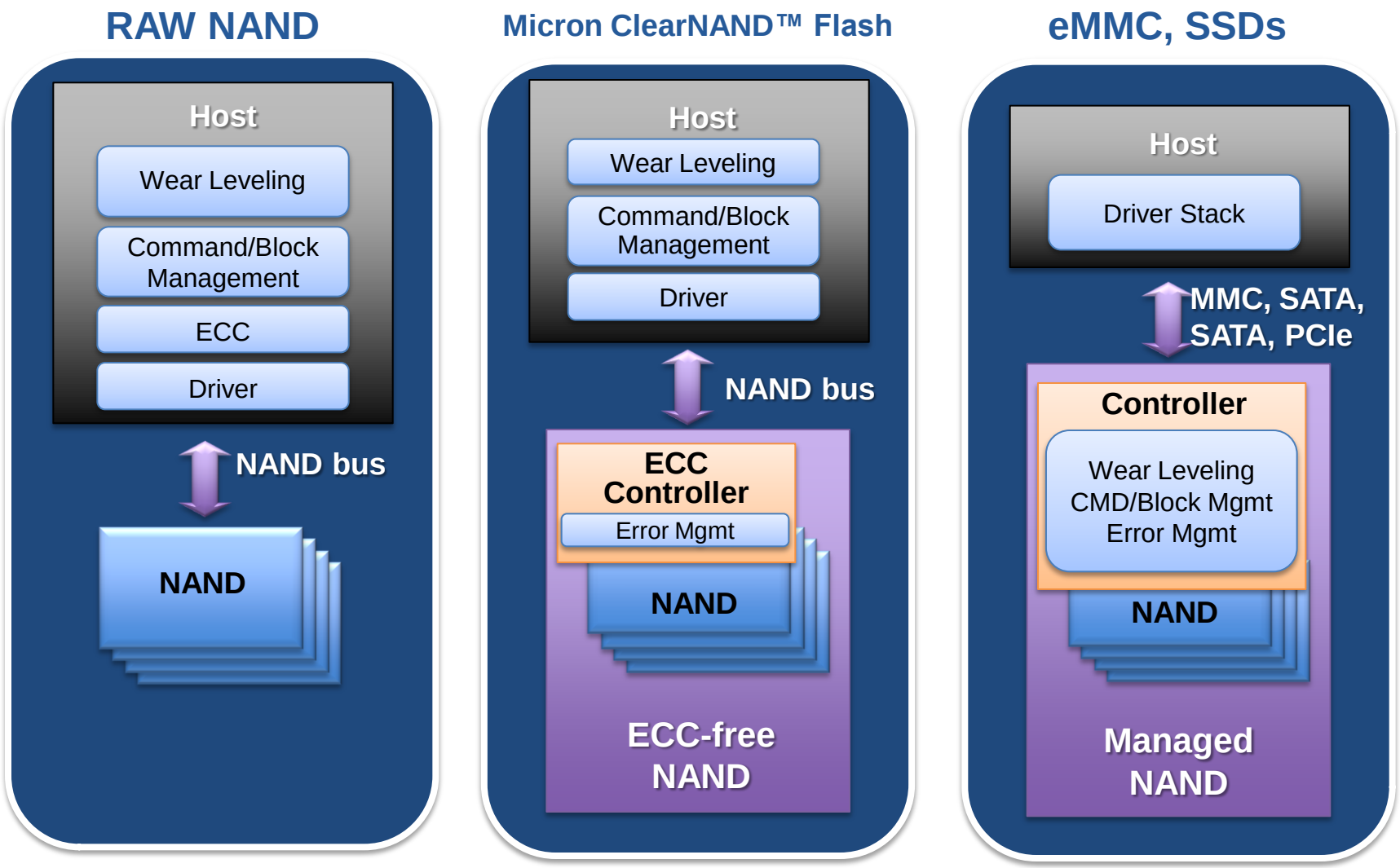
Micron's ECC Free Solution

- Controller performs
  - ECC
  - NAND error management
- Interrupt functionality
- Command queuing
- Internal copyback
- Electronic DQ mirroring



Single package with controller, command queue and up to 8 NAND die

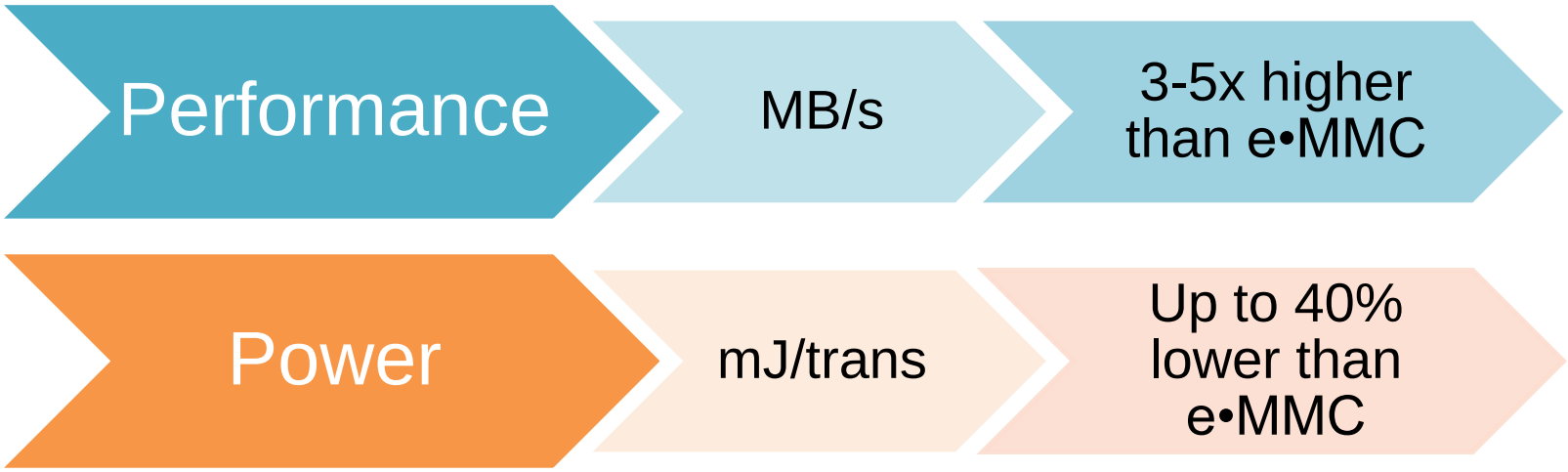
NAND-Based Storage Models



Problem for FPGA Implementations

- While NAND flash is a very attractive storage media, it does present challenges for system designers
  - As Geometries scale, the ECC required for reliable operation is becoming unwieldy consuming *more and more of the FPGA's resources*
- Block Management
  - The Flash Translation Layer (FTL) which is typically software, provides all of the block management and wear leveling
- Fully Managed devices (like e•MMC or others) address these issues, but can come at the price of lower performance/power

Additional Benefits of ECC Free NAND over e•MMC



Data measured using Micron ClearNAND™ Flash

Summary

ECC Free NAND provides many benefits to High Performance Applications including:

- FPGA based applications no longer needing to spend resources on ECC
- FTL utilizing command queuing and power management techniques provide drastic increases in performance and power when compared to fully managed solutions such as e•MMC