HARMAN – STORAGE MEMORY SOLUTIONS

IVAN IVANOV

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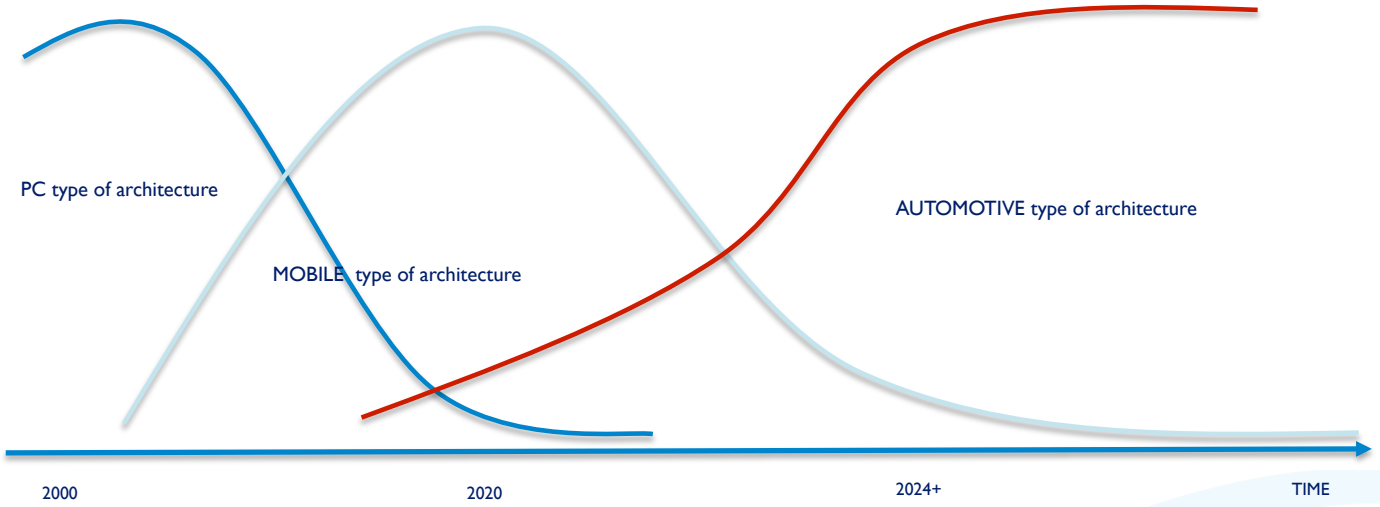
INDUSTRIES DRIVING MEMORY SYSTEM ARCHITECTURE INNOVATIONS



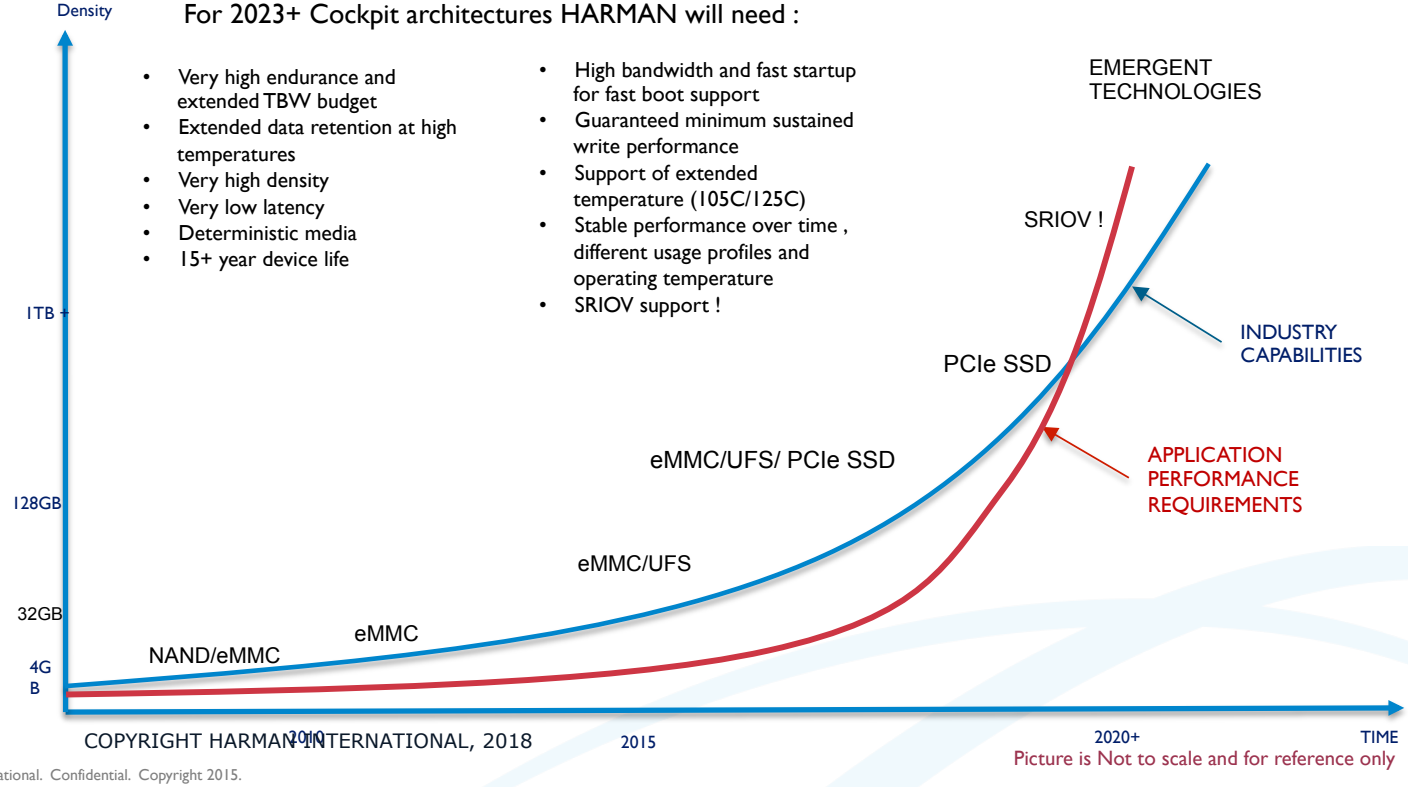
STORAGE TECHNOLOGIES EVOLUTION
HARMAN COCKPIT SYSTEM APPLICATION REQUIREMENTS

HARMAN

For 2023+ Cockpit architectures HARMAN will need :

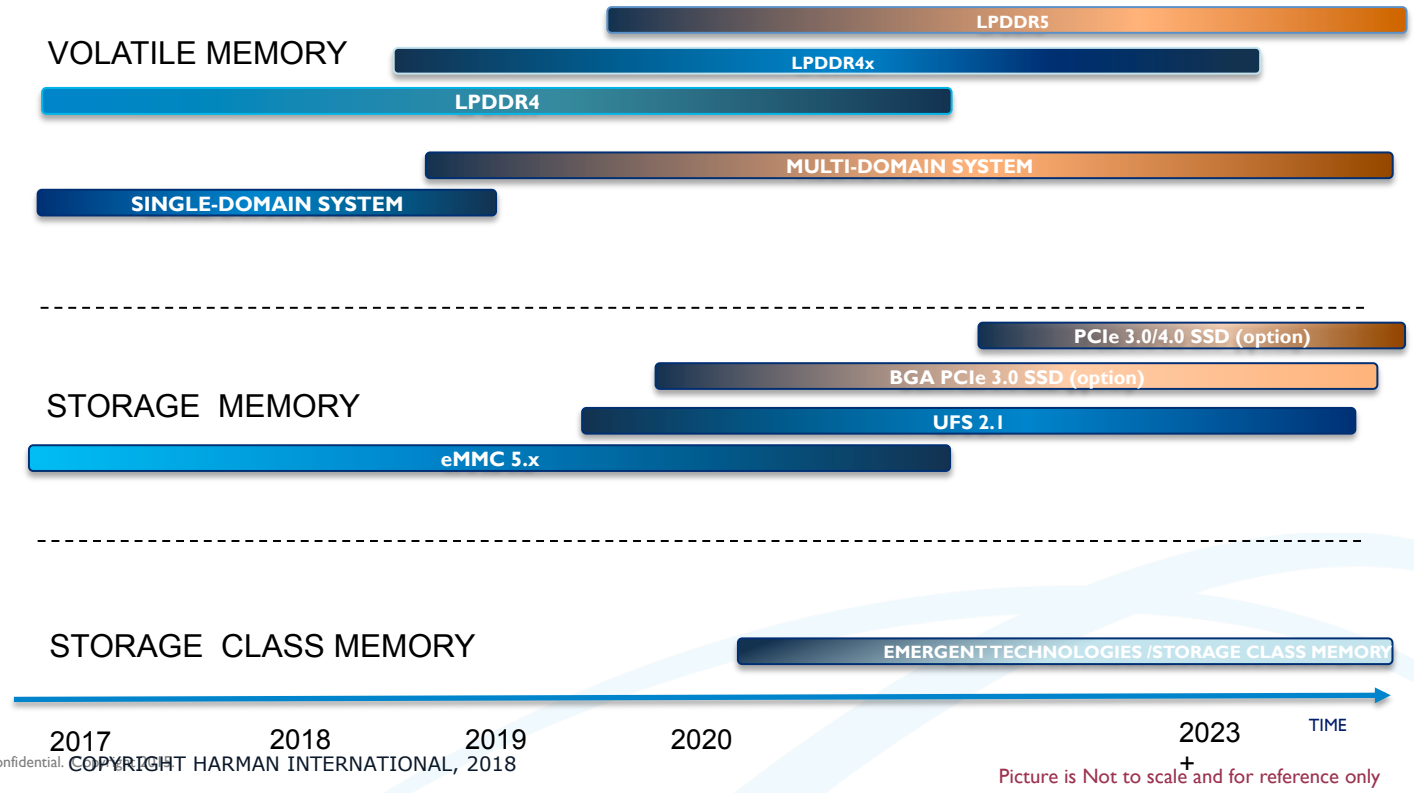
- Very high endurance and extended TBW budget
- Extended data retention at high temperatures
- Very high density
- Very low latency
- Deterministic media
- 15+ year device life

- High bandwidth and fast startup for fast boot support
- Guaranteed minimum sustained write performance
- Support of extended temperature (105C/125C)
- Stable performance over time , different usage profiles and operating temperature
- SRIOV support !



Picture is Not to scale and for reference only

AUTOMOTIVE KEY TECHNOLOGY TRANSITIONS HARMAN NEEDS AT PLATFORM LEVEL
(FOR REFERENCE ONLY)



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SCM STORAGE CLASS MEMORY ARCHITECTURE
HARMAN HIGH-LEVEL REQUIREMENTS

- ✓**Extended data retention → 15 years+ at temperature >> 95C Tc**
- ✓**Very high Read/Write speed (DRAM like) , symmetric access**
- ✓Byte-accessible
- ✓**NO wearing mechanism**
- ✓**BER (Bit Error Rate) → Potential Replacement for DRAM (UBER 10e15)**
- ✓**On die ECC in flight (no added latency in read mode)**
- ✓**Zero power in standby mode**
- ✓**NO refresh needed**
- ✓**Instant-on support**
- ✓**Non-volatile**
- ✓**MLC/TLC/QLC.. - capable technology**
- ✓**3D-capable**
- ✓**Scalable (for reference → below 5 nm)**
- ✓**Samples 8/16 Gbits per die and more in 2023+**
- ✓**Cost infrastructure → better (less) than DRAM**

THANK YOU