

# Memory rises above Wall

Nov. 2020

# Megatrends for Future Society



## Health Care

### Life Expectancy

62years (2000) → 68years (2016)

### Smart Healthcare Market

\$57B (2015) → \$169B (2020)



## Life Quality

### Industry 4.0

Artificial Intelligence /  
IoT / Autonomous Car /  
Cyber-physical system based  
automation



## Energy Efficiency

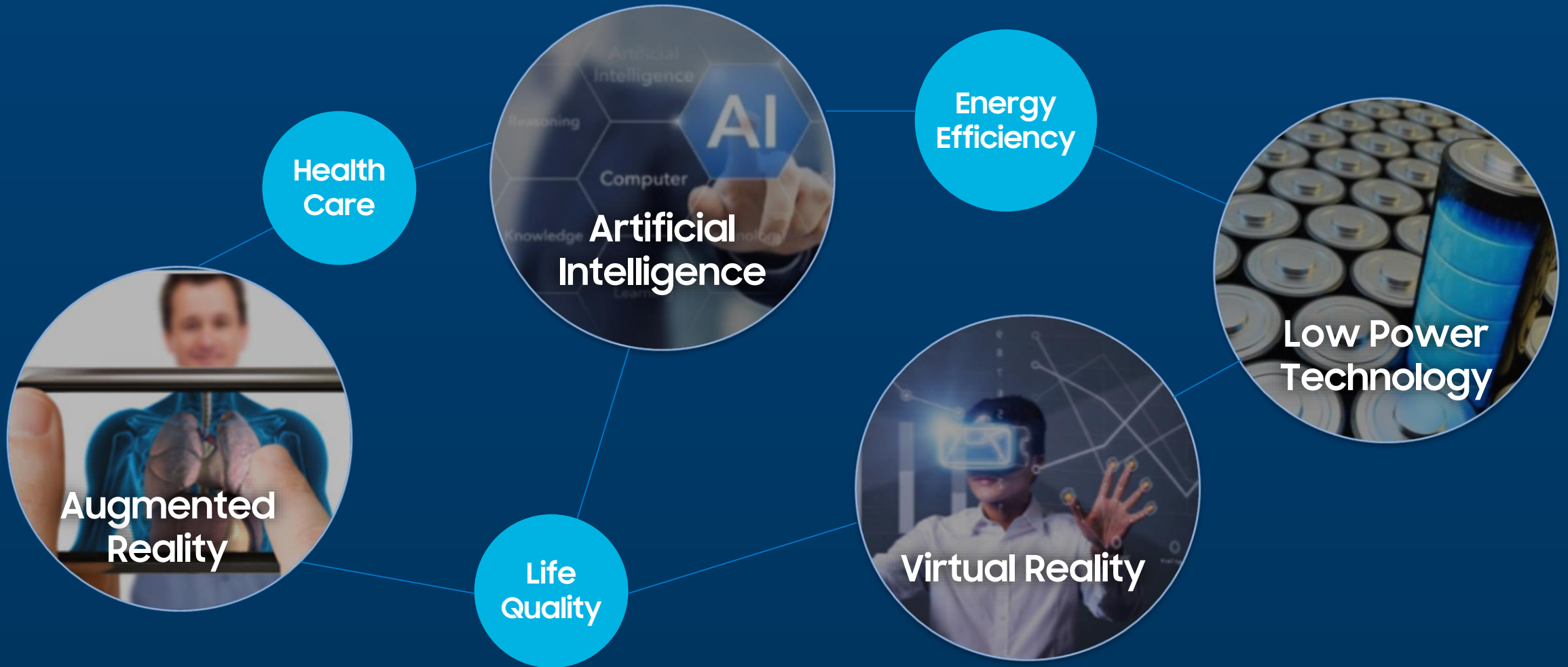
### Energy Demands

11Btoe<sup>1</sup>(2005) → 17Btoe(2030)

1. Billion tones oil equivalent

# Relationship with IT Technologies

IT technologies are key solutions to solve the big problems of future megatrends



# Semiconductor's Position



**Augmented Reality**  
Mobile Devices



**Artificial Intelligence**  
Super Computers



**Virtual Reality**  
VR Headsets



**Low Power**

Display Driver IC



Mobile One Chip DDI

Image Sensors



Slim Form Factor

Processors



10nm FinFET

**DRAM**



LP-DRAM

NAND Flash

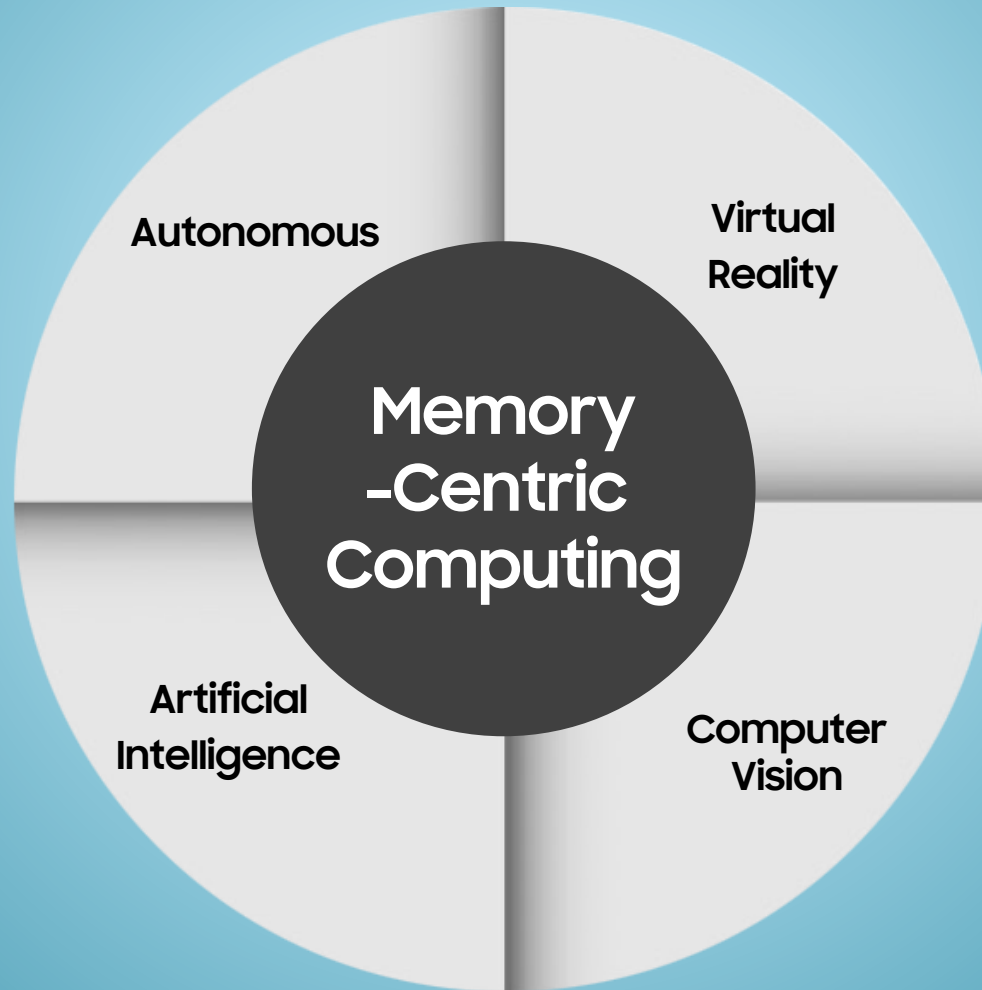
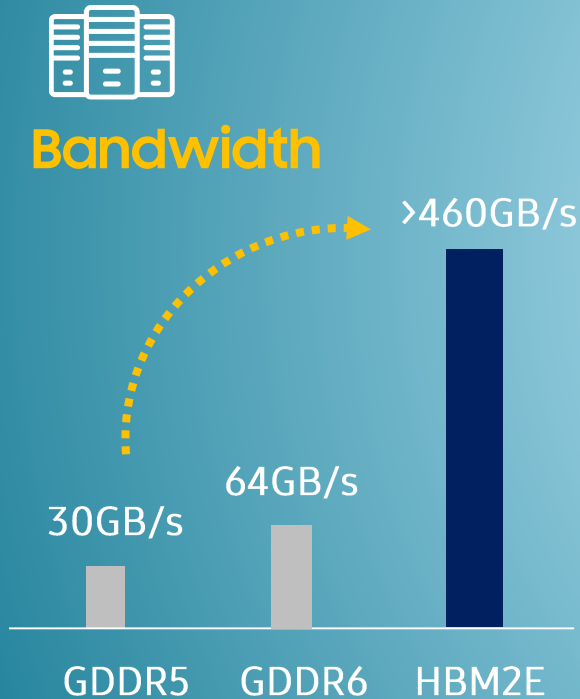


V-NAND

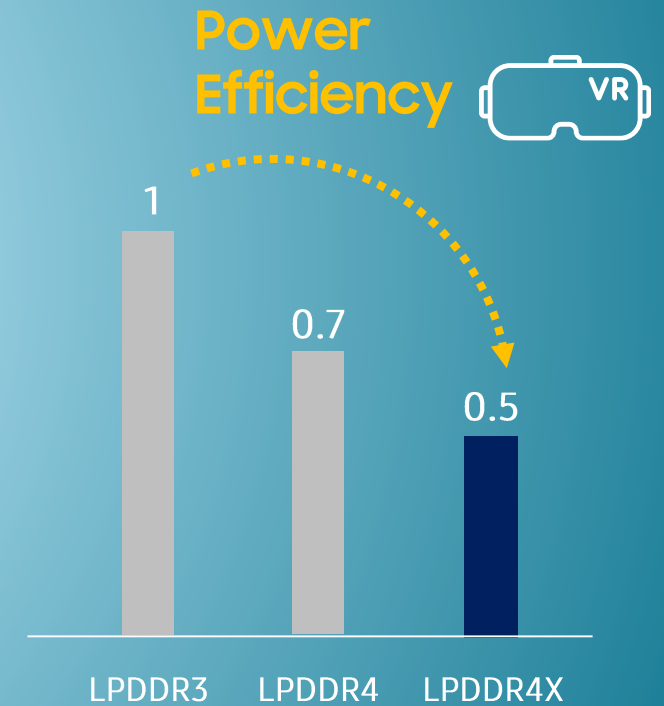
✓ Semiconductor takes important role in every IT technologies

# Memory is at the core of New Applications

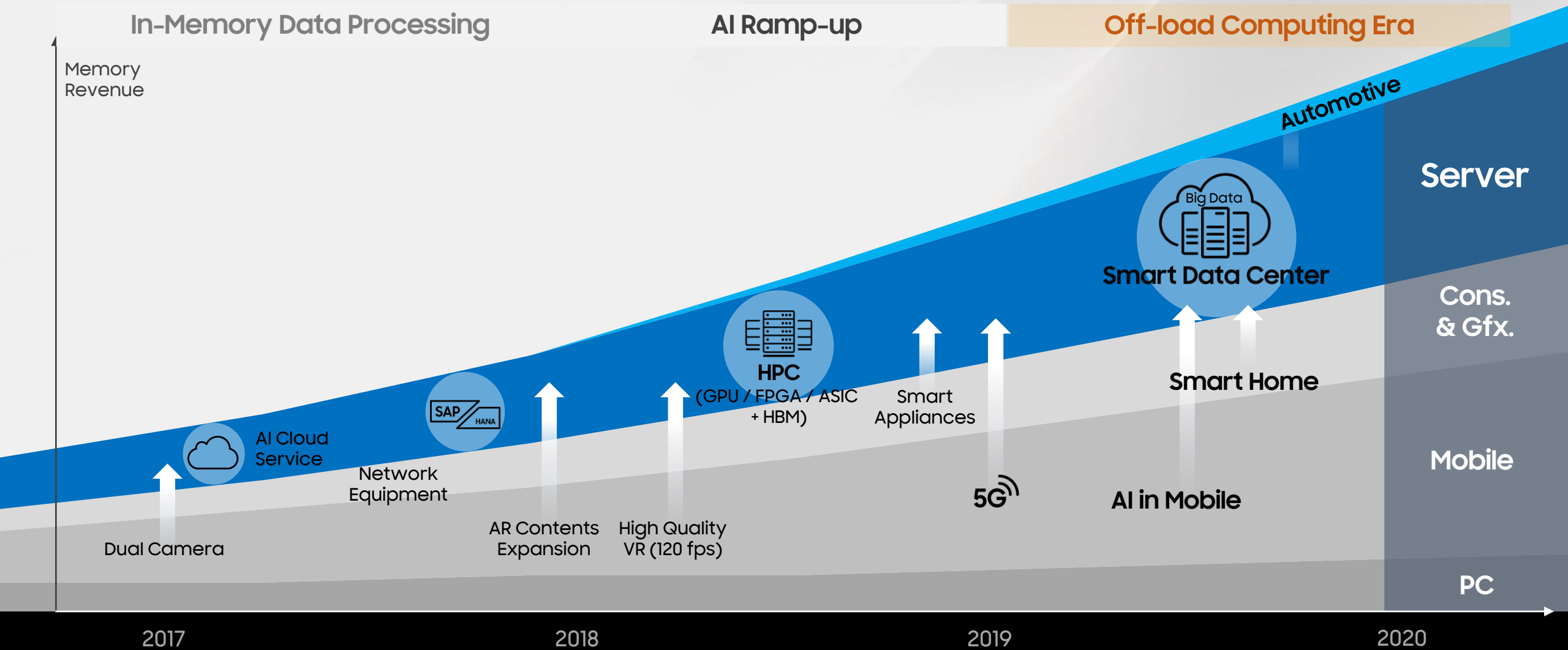
## Higher Performance



## Lower Power

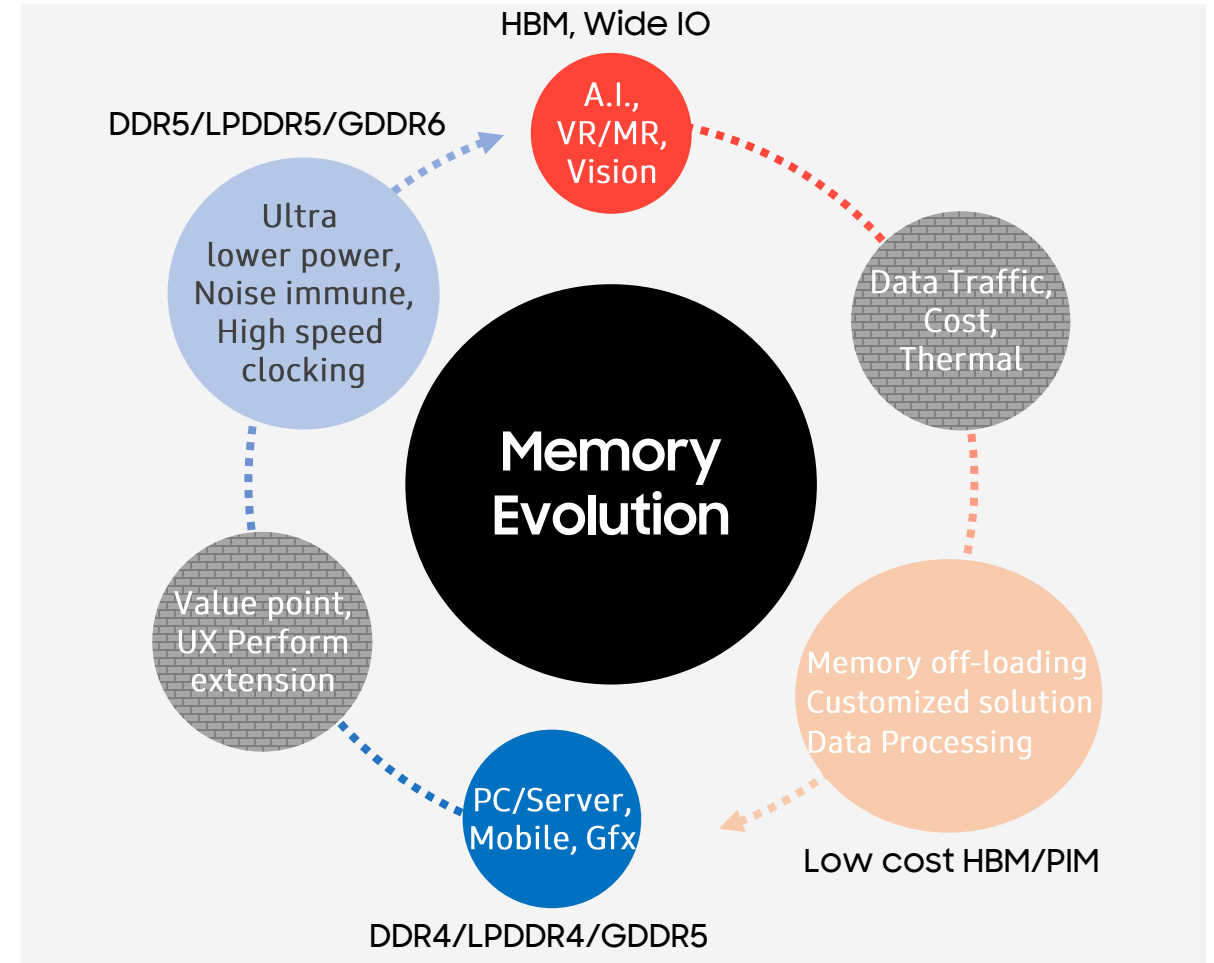
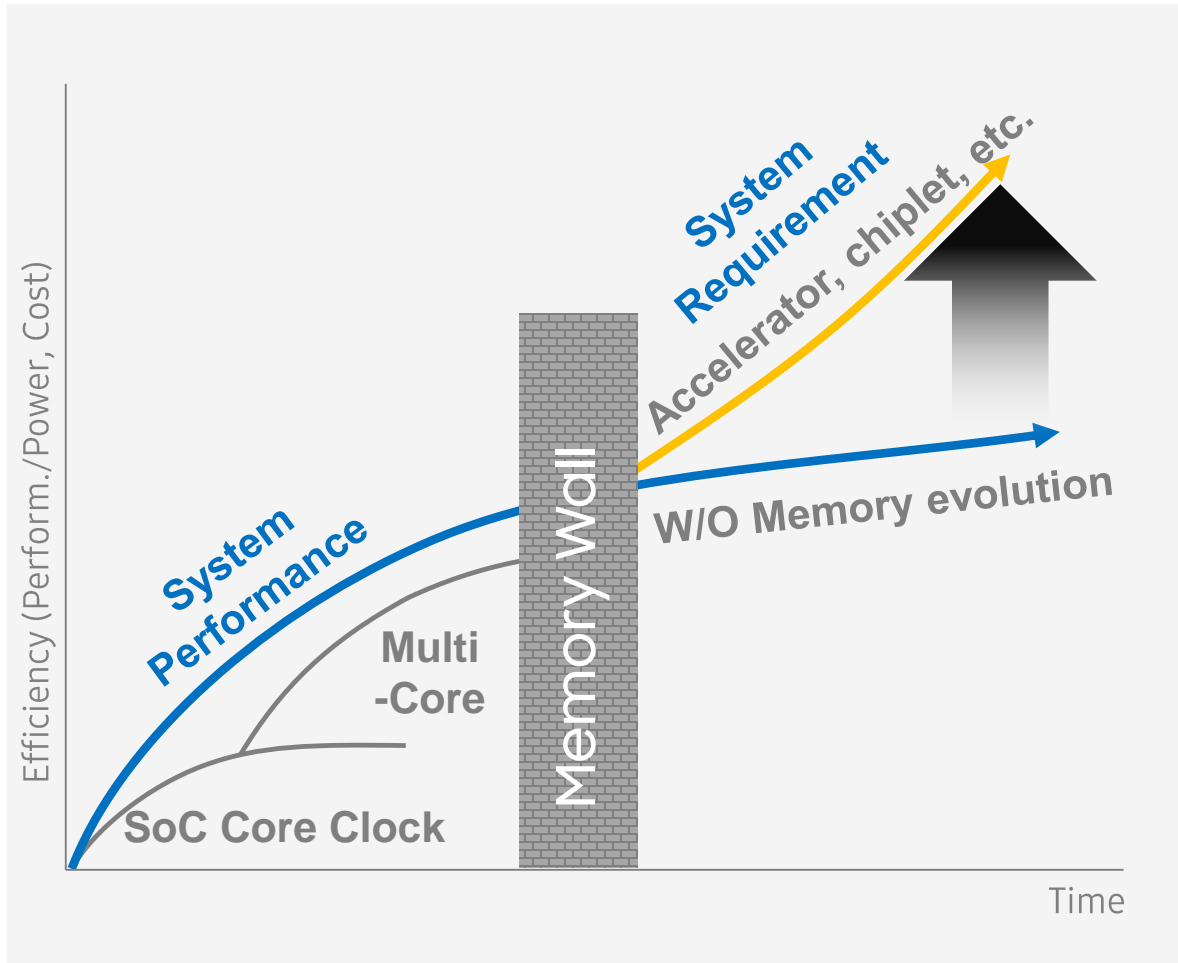


# Snowball Effect in Memory Usage



# Memory-centric System Evolution

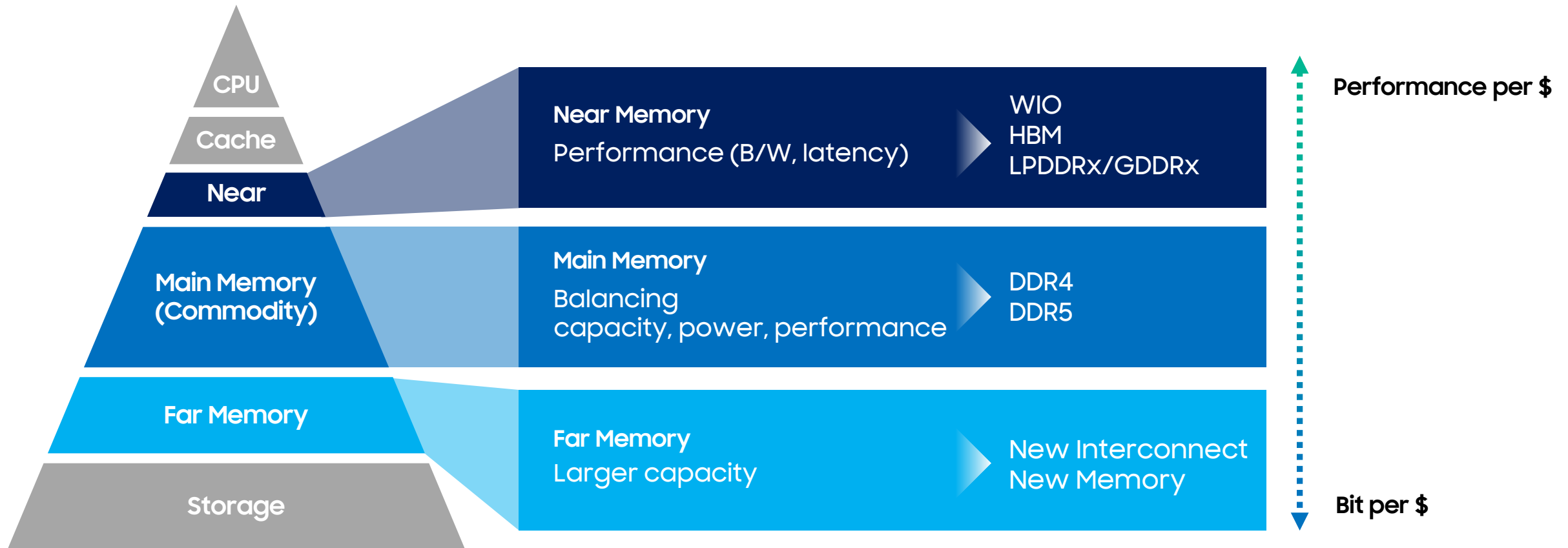
Extreme B/W, performance/power, data processing, cost effective solutions





# Challenges on Memory Hierarchy

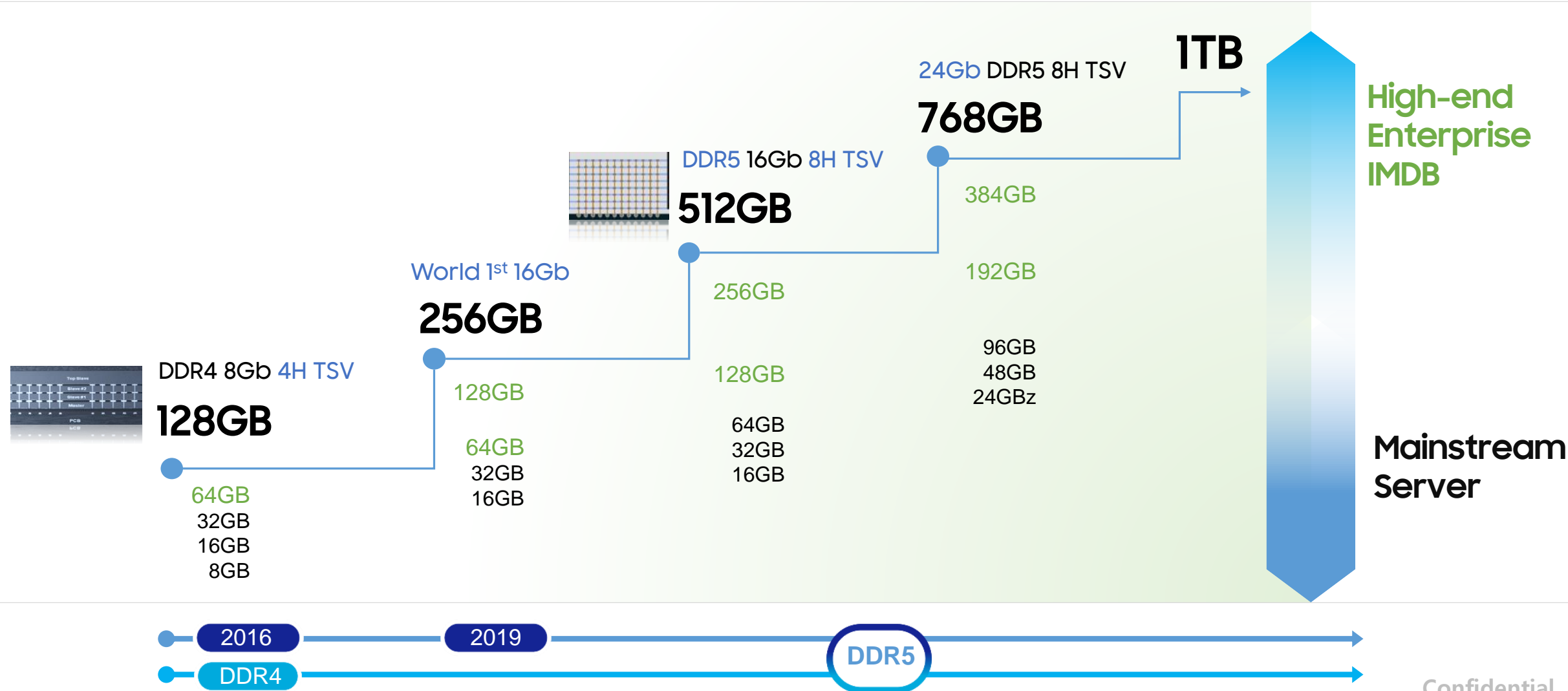
Transitioning from single tier main Memory architecture to multi-tier near and far Memory architecture





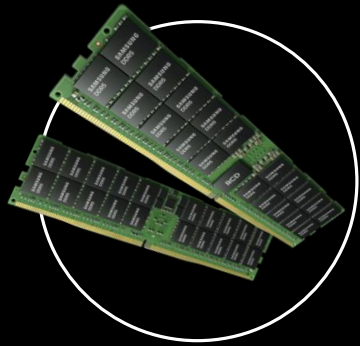
# DRAM Capacity Solutions with Advanced Technologies

Full spectrum of capacity coverage from low-end to high-end

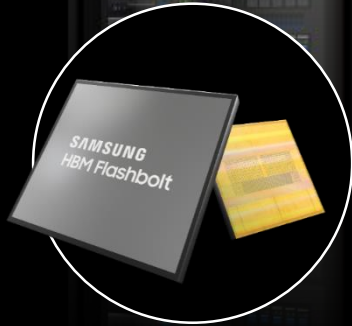


Samsung's Data Center Solution

# Highest Performance, Largest Capacity



DDR5 512GB RDIMM



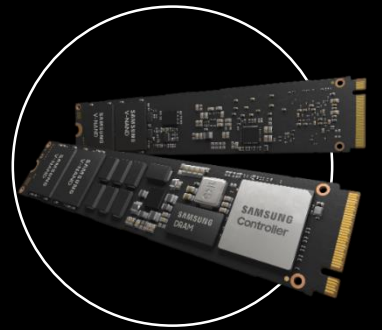
HBM Flashbolt



E1.S PM9A3



U.2 PM9A3



M.2 PM9A3

DDR5 512GB RDIMM

# Largest Capacity DIMM in the World

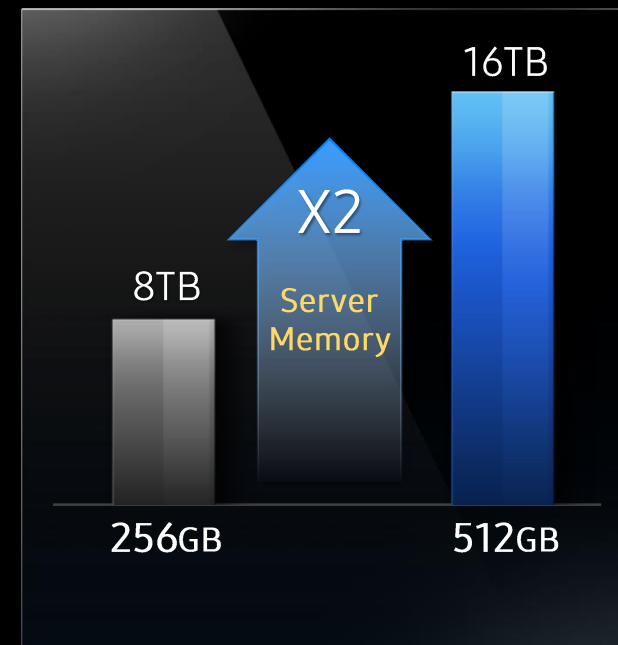
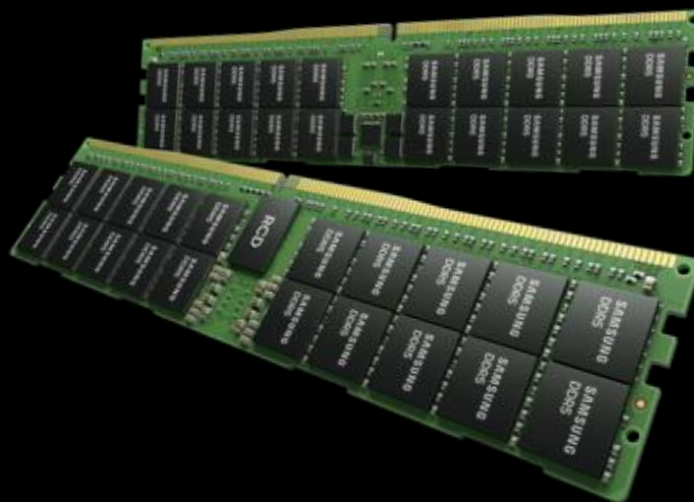
512GB RDIMM opens new data center era through breaking the capacity wall

Largest capacity w/3D

512GB

1.5x Bandwidth

4,800Mbps



\* 2P Server base (16slot per CPU)

HBM Flashbolt

# Highest Performance DRAM in the World

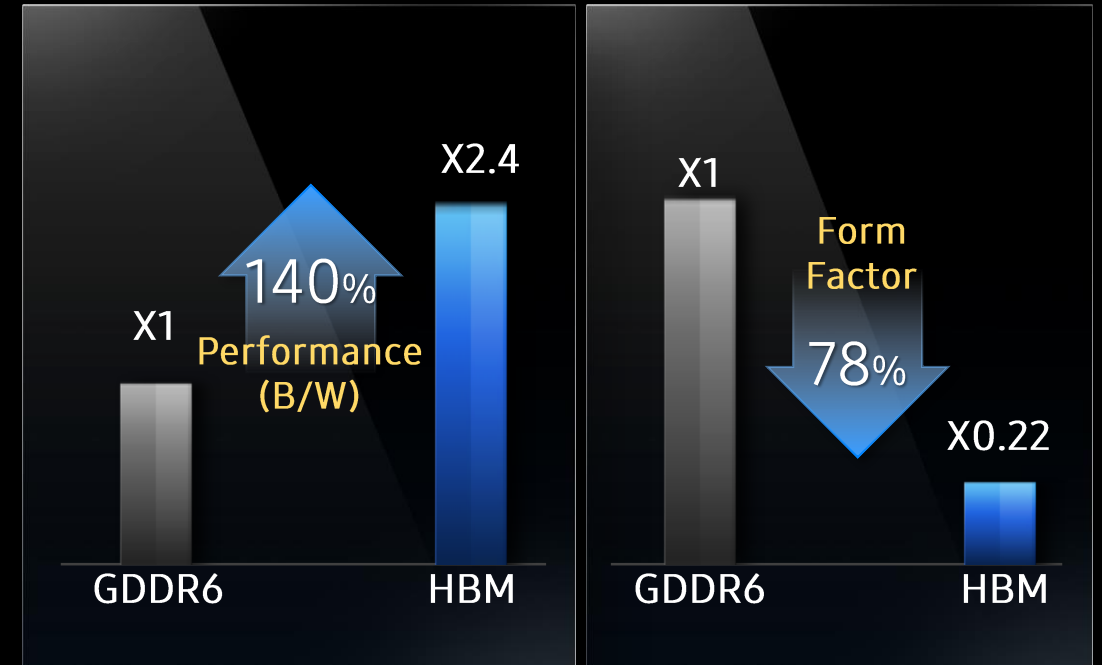
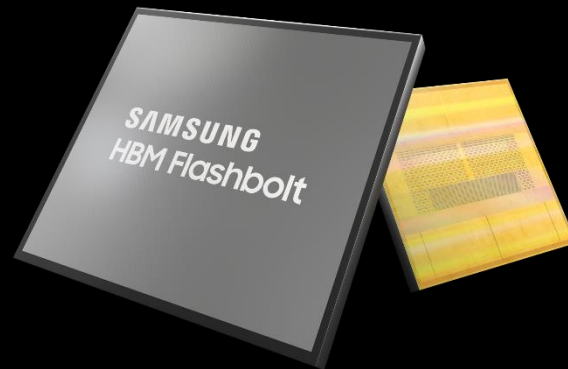
HBM Flashbolt enables AI supercomputing power achieving 460GB/s

Highest Bandwidth

460.8GB/s

Large Capacity w/3D

16GB / 1 cube



※ System area (HBM 4pcs vs GDDR 12pcs)

HBM Flashbolt vs. GDDR

# Optimized design with better performance

HBM Flashbolt offers compactable design combining state-of-the-art TSV technology

## Performance

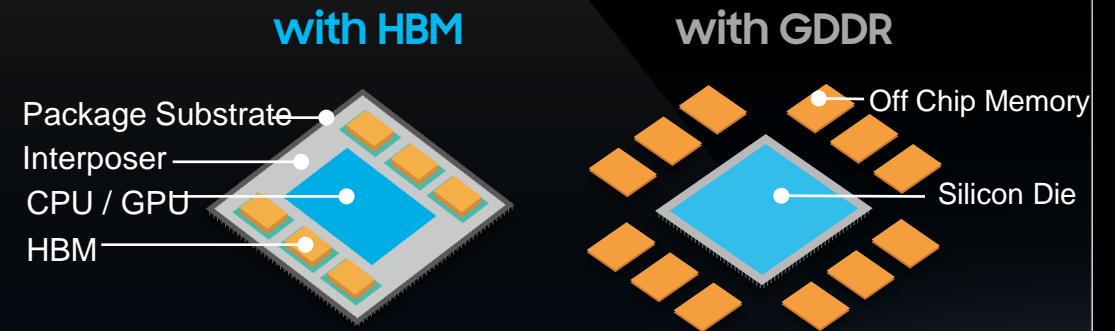
Bandwidth



※ GD6 16Gb x32\*12 vs HBM2E Flashbolt 8H\*4

## System

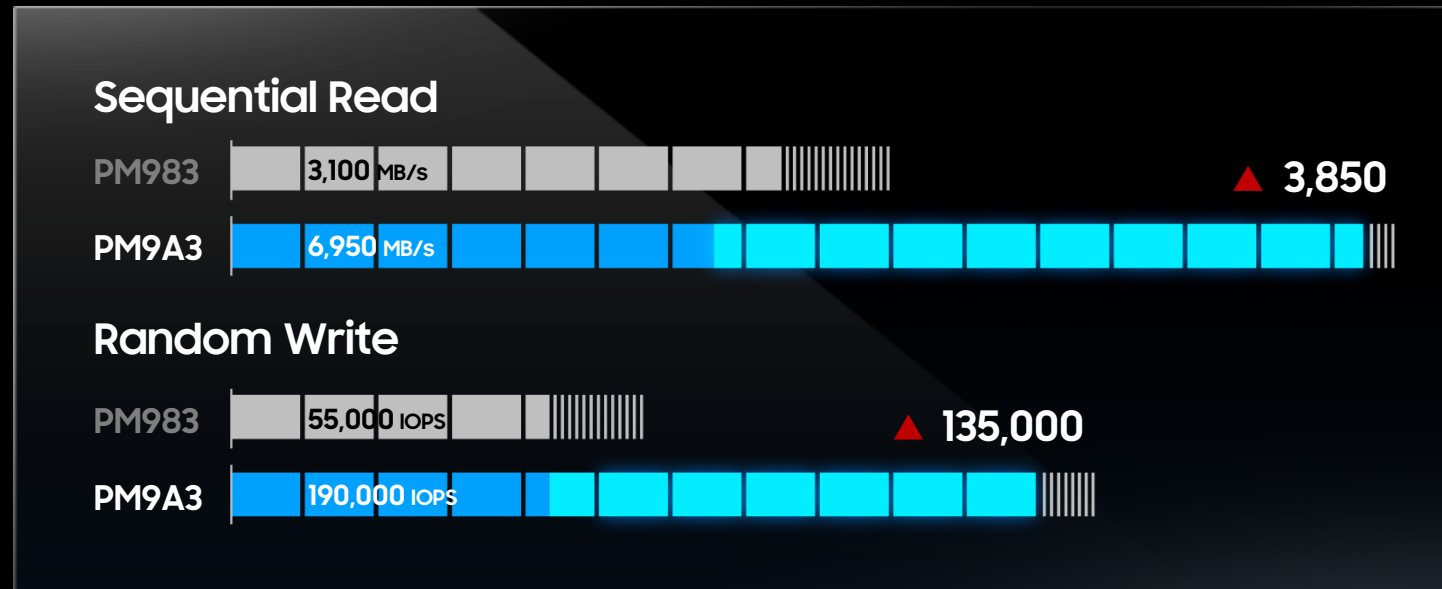
System area with HBM is more compactable  
(HBM 4pcs vs GDDR 12pcs)



PM9A3 PCIe Gen 4 SSD

# Tremendous Performance in Storage System

PM9A3 delivers up to 6,950 MB/s in sequential read speed with form factor flexibility



E1.S



U.2



M.2

SZ1735a Z-SSD

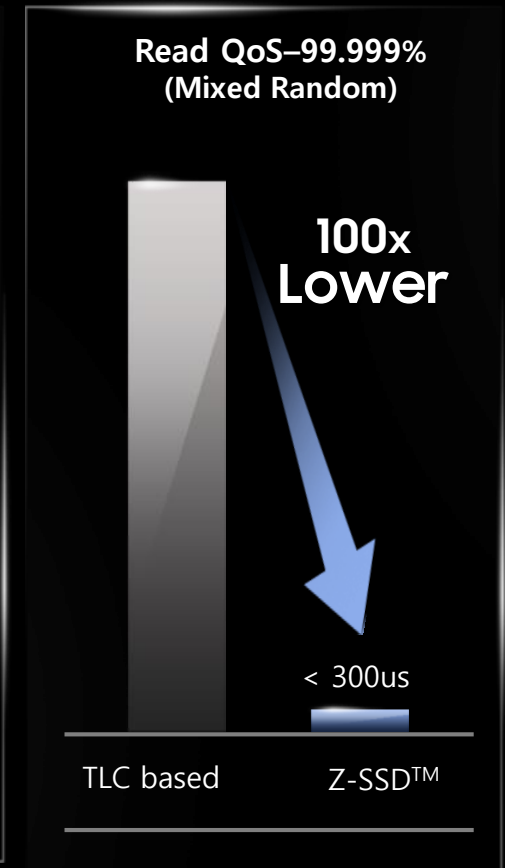
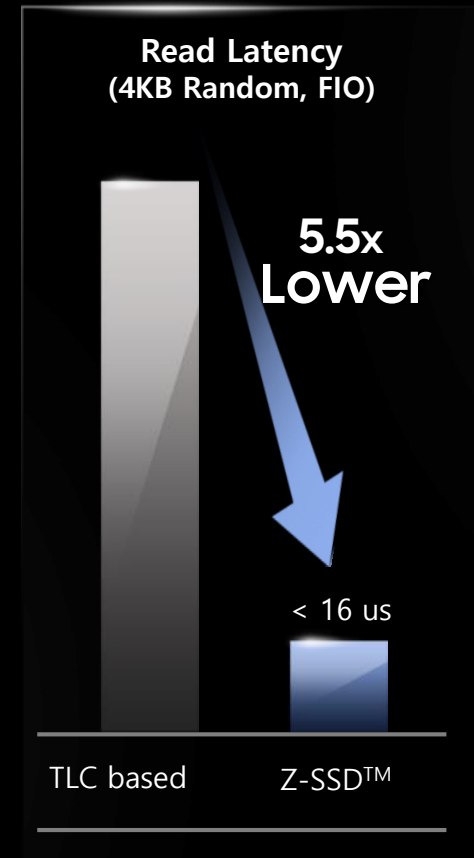
# Ultra Low Latency SSD in for Data Centers

SZ1735a enables fast system responsiveness with <100 us latency

For Data Analytics & A.I.



Product Name	SZ1735a
NAND	V5 SLC NAND
Controller	Samsung Eagle Controller
Capacity (OP 28%)	up to 6.4TB
Interface	PCIe Gen4 x4 NVMe
Form Factor	2.5" U.2
DWPD*	30 @3Month, 60 @1Month





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