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# SAMSUNG MEMORY

Jun, 2019

Investor Presentation

# CONTENTS

- BUSINESS UPDATE  
MEMORY MARKET OPPORTUNITIES  
SAMSUNG STRATEGY

# SAMSUNG MEMORY BUSINESS REVIEW

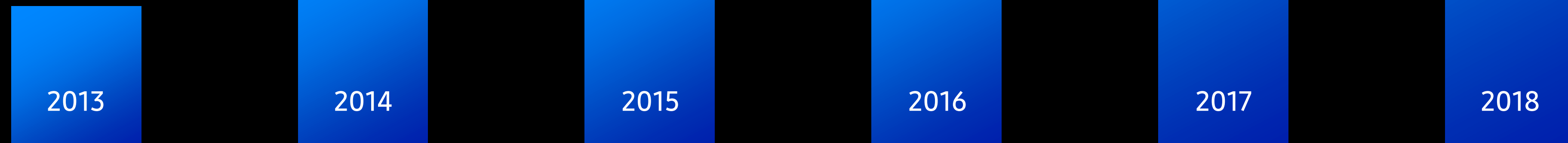
#1 in Memory Worldwide Since 1993, Well Balanced DRAM/NAND Portfolio

2018 Market Share

DRAM **45%**

NAND **41%**

Market Share  
Revenue **43%**



# MEMORY BIZ. PARADIGM SHIFT LED BY SAMSUNG

Samsung is Powering the Technologies that bring Innovation to Lifestyle

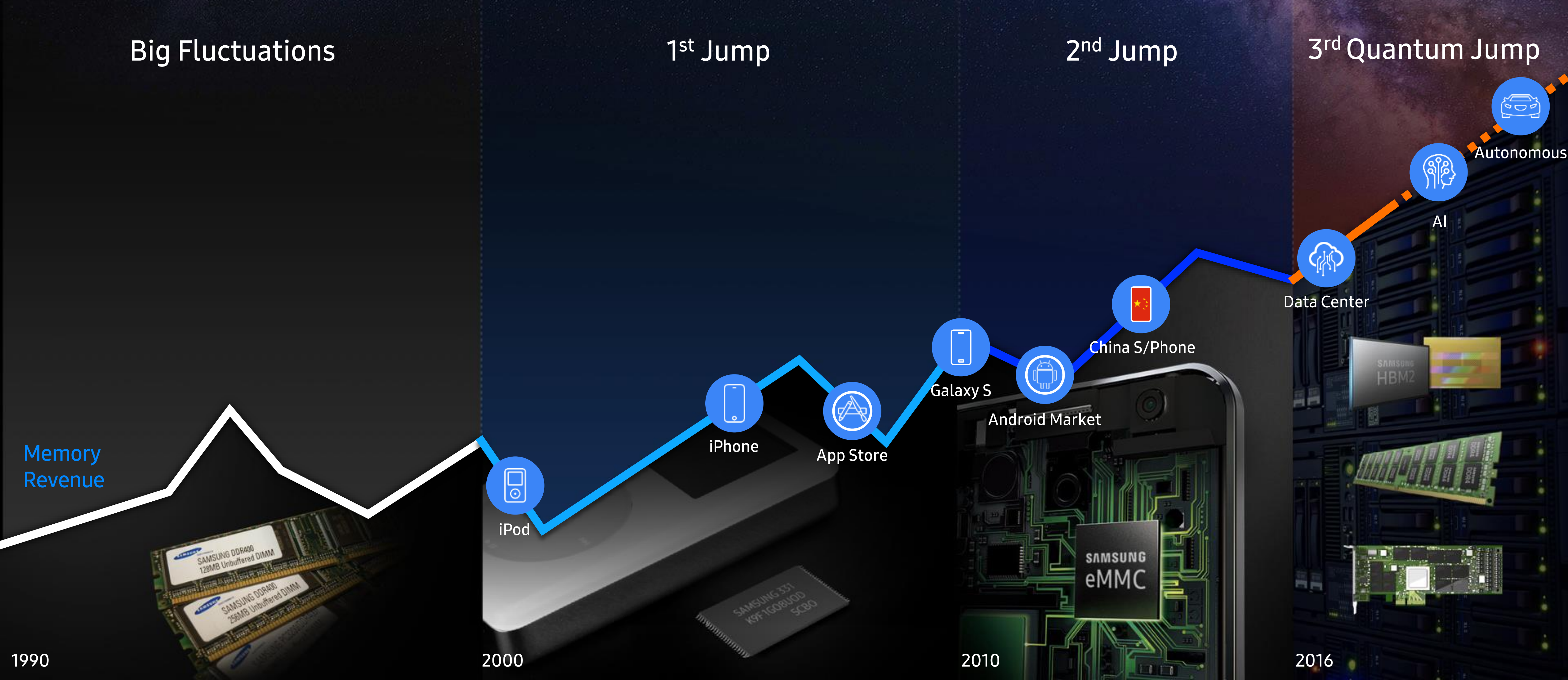
Big Fluctuations

1<sup>st</sup> Jump

2<sup>nd</sup> Jump

3<sup>rd</sup> Quantum Jump

Memory Revenue



1990

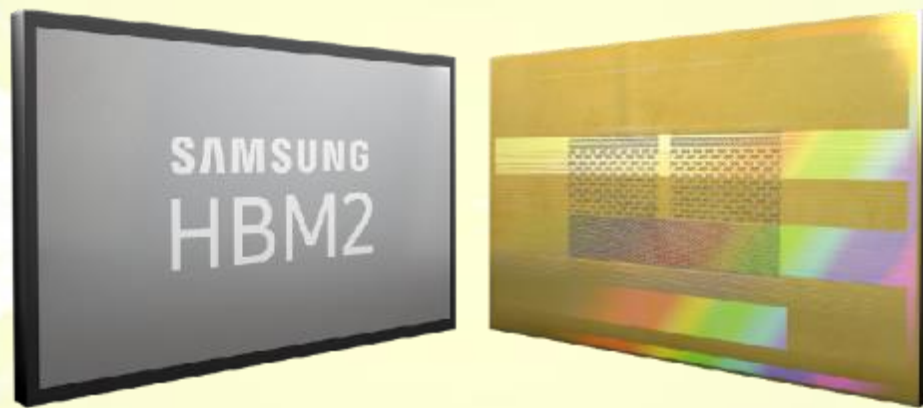
2000

2010

2016

HUMAN

AI



Samsung Memory

# CONTENTS

- BUSINESS UPDATE
- MEMORY MARKET OPPORTUNITIES
- SAMSUNG STRATEGY

# GROWTH OF THE PUBLIC CLOUD

Explosive Growth of Unstructured Data

1<sup>st</sup> WAVE



Cloud Service Providers

2016

2<sup>nd</sup> WAVE



.Com & Forbes Top100

3<sup>rd</sup> WAVE



Telco Companies

2020

## THE FLOOD OF DATA

4<sup>TH</sup> WAVE



Automotive Companies



# SMART CITY & AUTONOMOUS CAR FUELED BY 5G NETWORK

Huge Amounts of Data Generated by Hyper-connected Devices

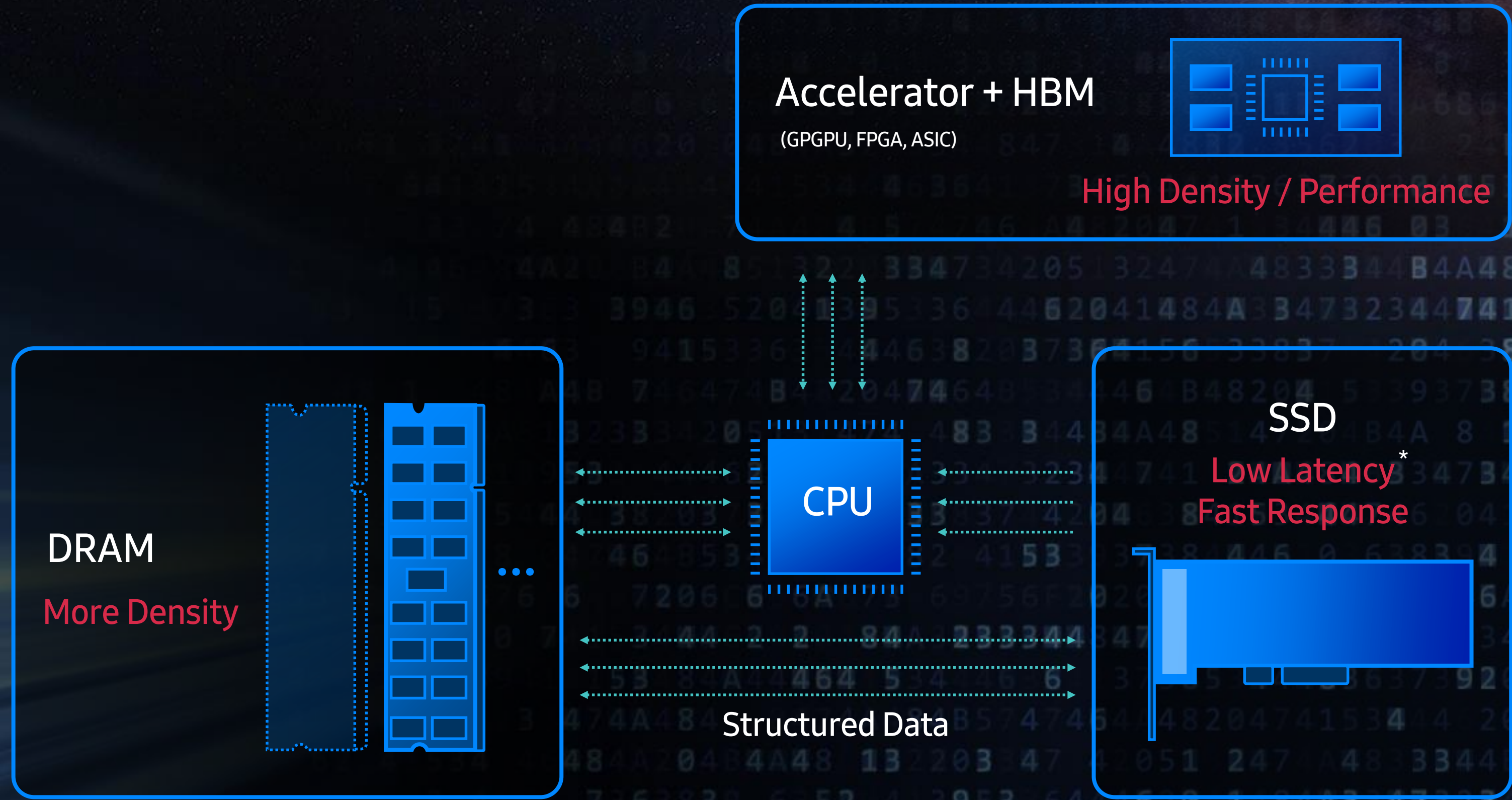


# MARKET OPPORTUNITY IN BIG DATA ANALYTICS

Demand Increase for High Density & Performance Memory to Enhance Computing Power



**CLOUD  
BIG DATA**  
Un-structured Data

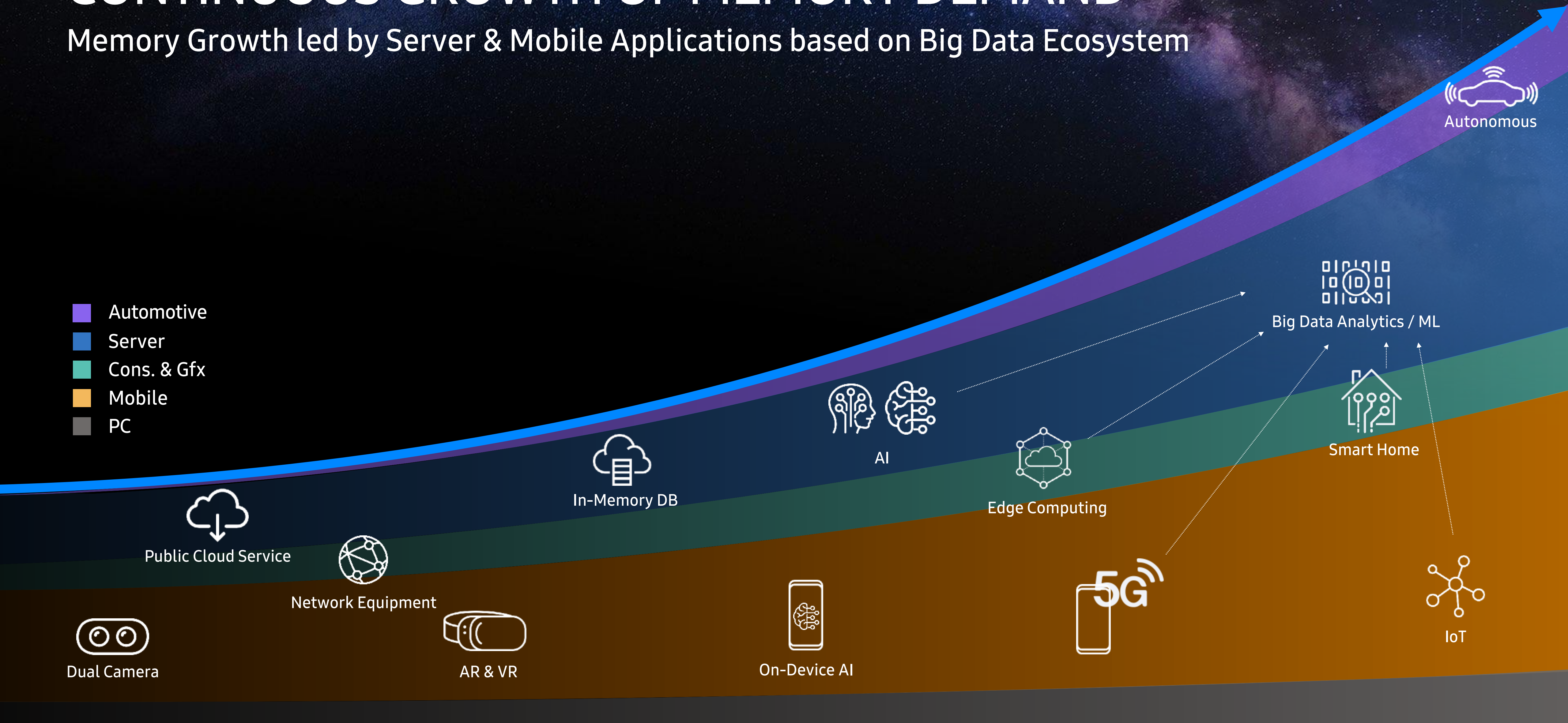


\* Latency: Time Delay between input and output in a system

# CONTINUOUS GROWTH OF MEMORY DEMAND

Memory Growth led by Server & Mobile Applications based on Big Data Ecosystem

- Automotive
- Server
- Cons. & Gfx
- Mobile
- PC



Big Data Analytics / ML



Smart Home



IoT



AI



Edge Computing



In-Memory DB



Public Cloud Service



Network Equipment



Dual Camera



AR & VR



On-Device AI



5G

2017

2018

2019

2020

# CONTENTS

BUSINESS UPDATE

MEMORY MARKET OPPORTUNITIES

- SAMSUNG STRATEGY

# SAMSUNG STRATEGY

Break-through  
Technology

COST LEADERSHIP

Enhanced  
Solutions

S/W & CONTROLLERS

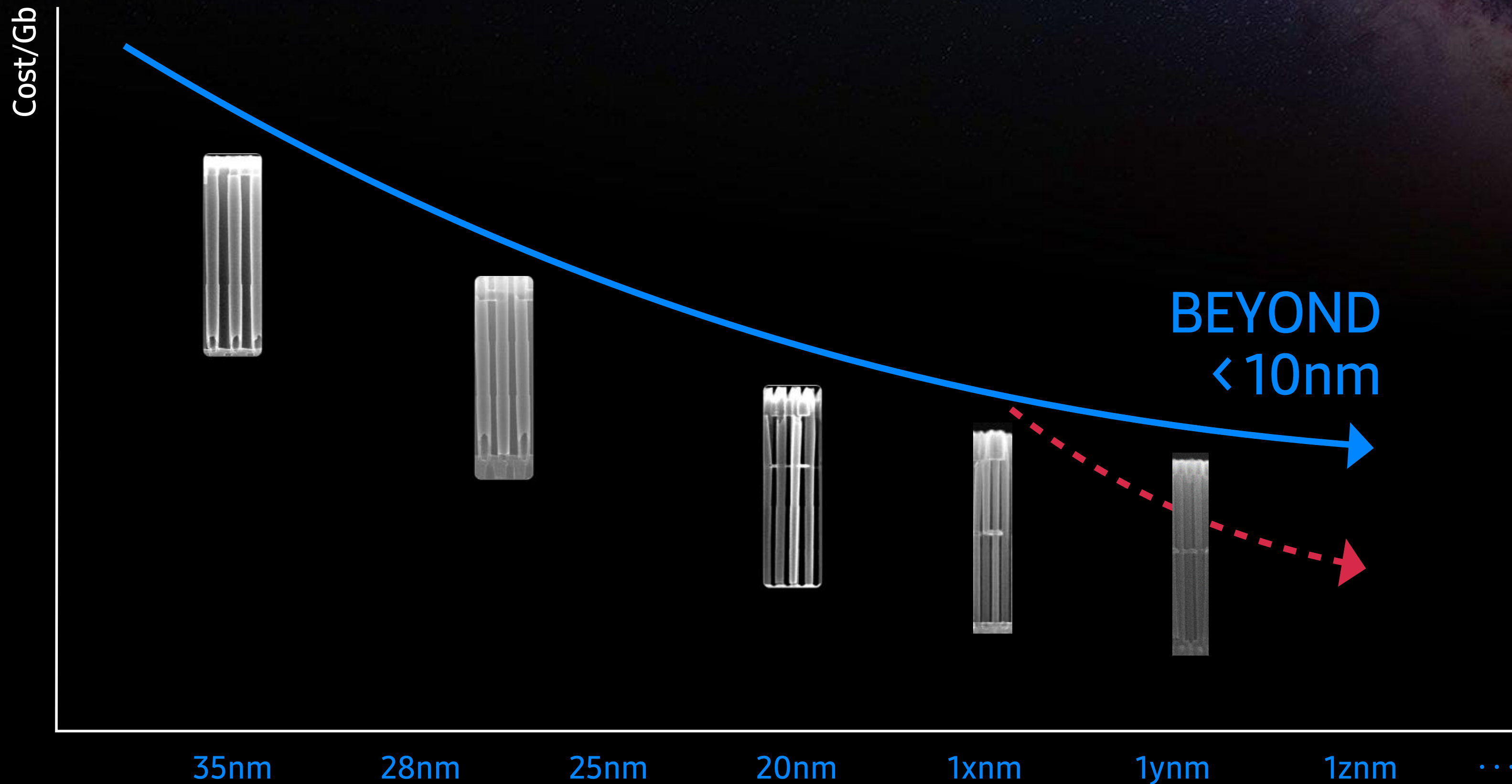
Advanced  
Manufacturing

EFFICIENCY & FLEXIBILITY

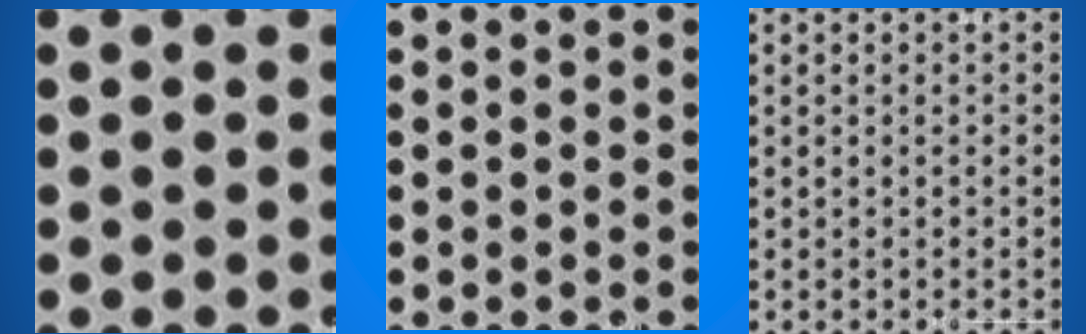
# CONTINUOUS TECHNOLOGY SCALING

Thru Technology Evolution

## DRAM

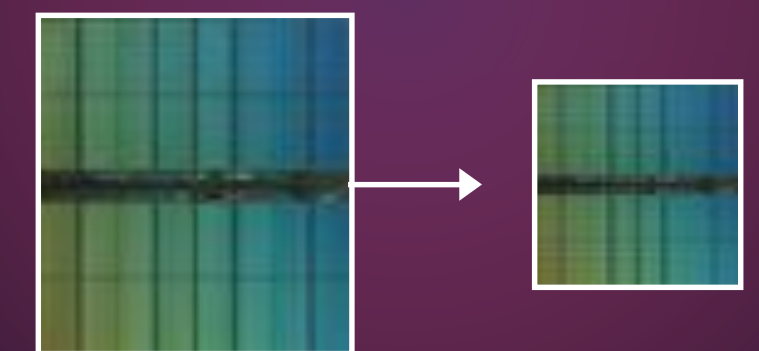


## FUTURE DRAM TECHNOLOGY



- \*DPT : Double Patterning Technology
- \*QPT : Quadruple Patterning Technology
- \*EUV : Extreme Ultra Violet

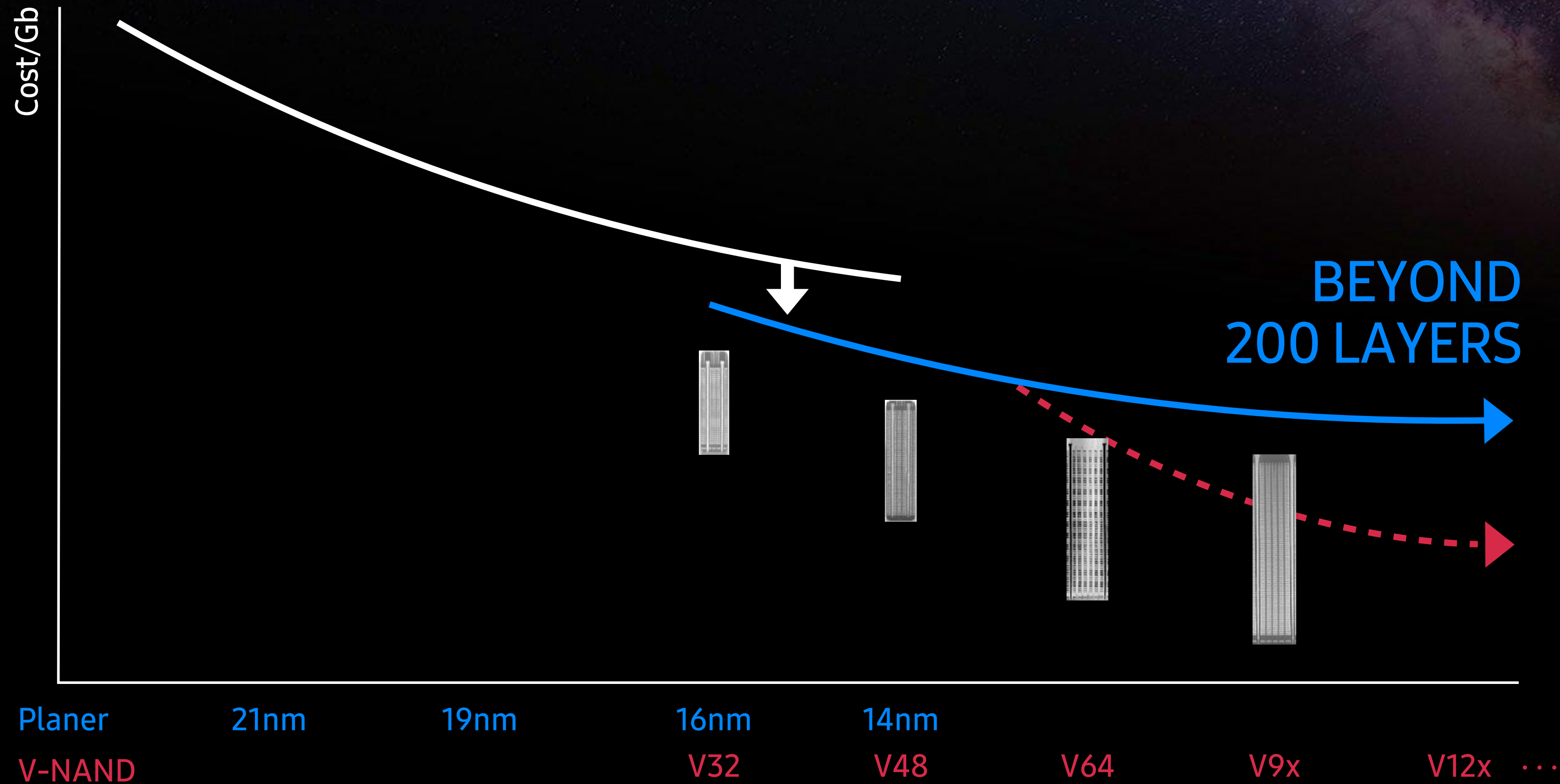
## ADVANCED DESIGN TECH



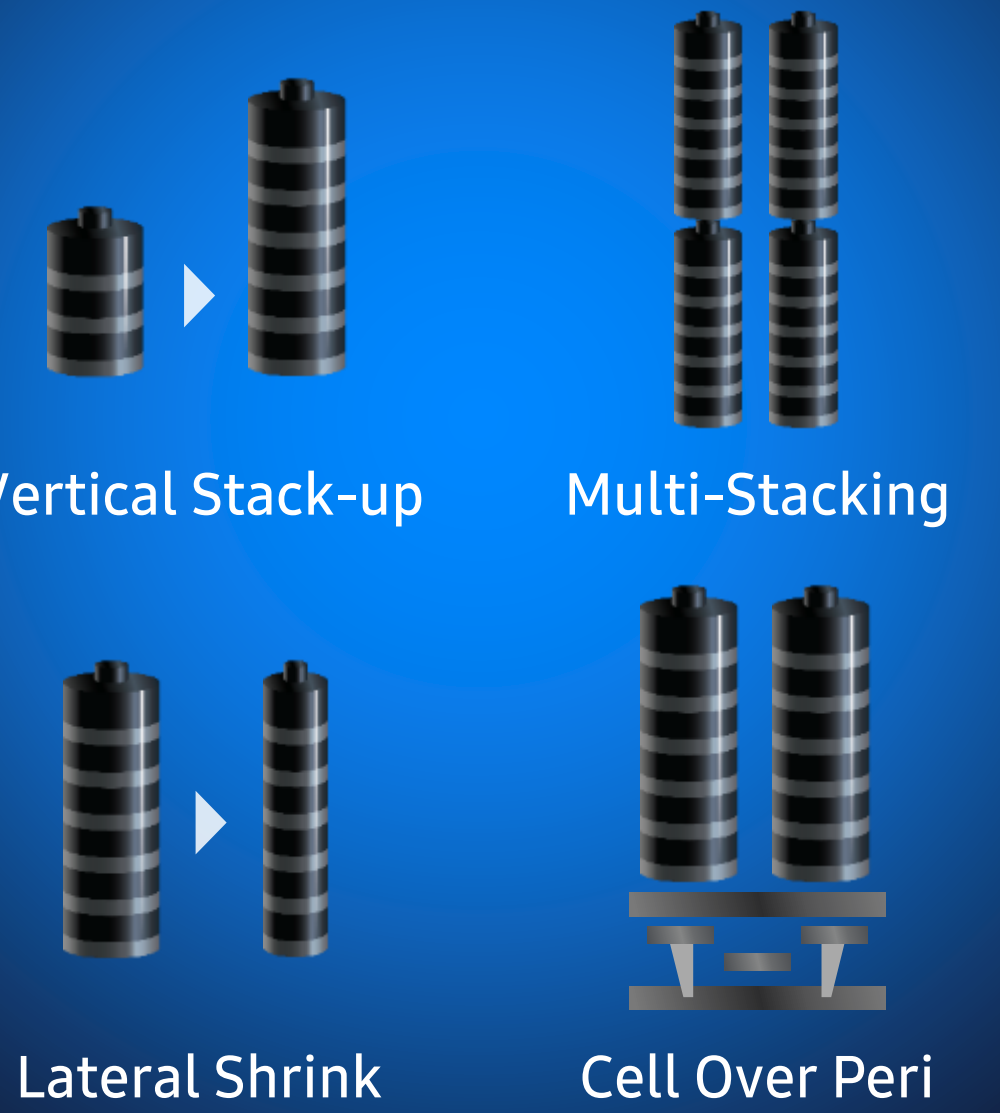
# PUSHING THE LIMITS OF V-NAND

Thru Innovative Layer Stacking Technology

## NAND



## FUTURE V-NAND TECHNOLOGY



## QLC



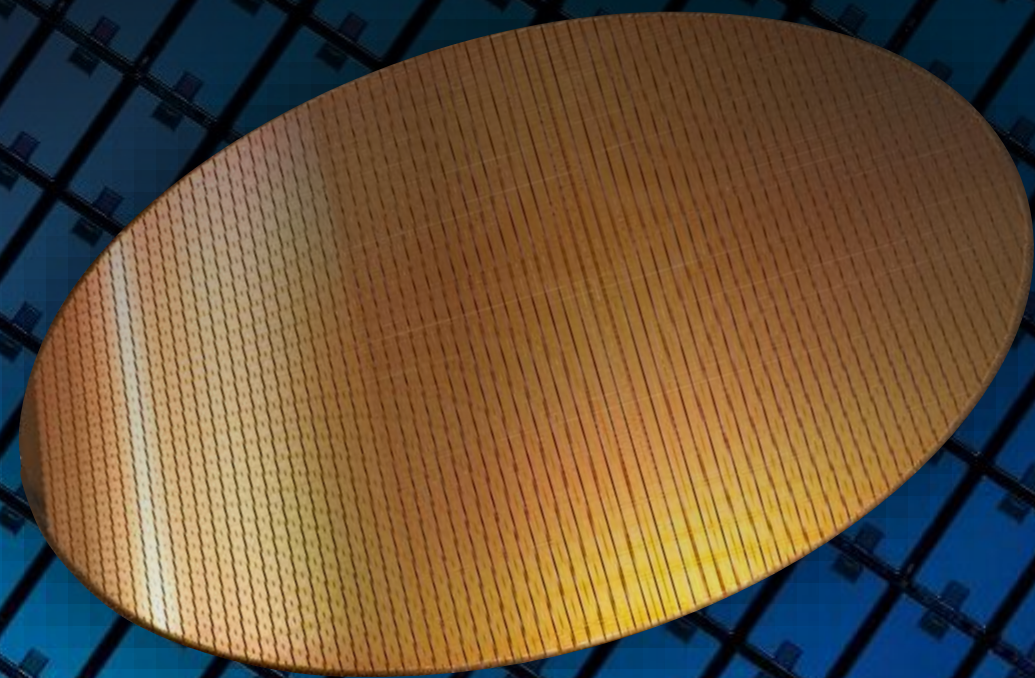
\* QLC: Quad-Level Cell

# UNIQUE CAPABILITIES FOR DIFFERENTIATED SOLUTIONS

Integrating Key Components to Deliver Value-added Solutions

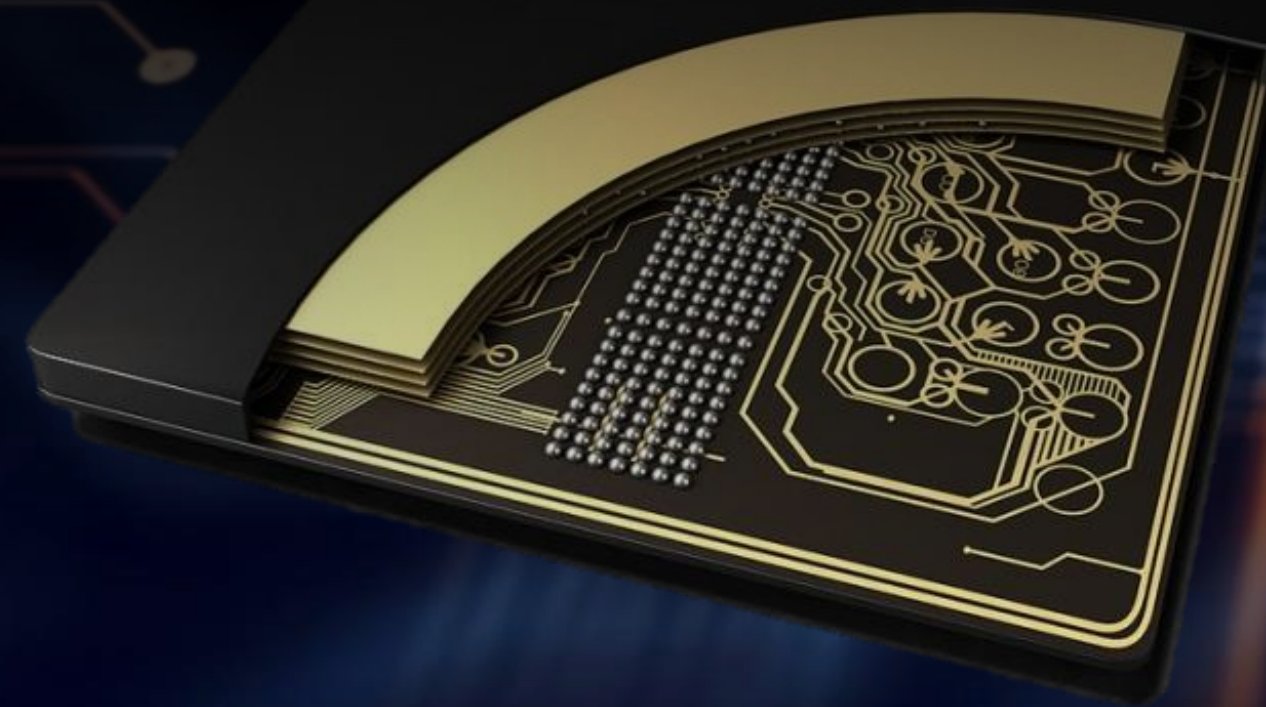
## ADVANCED PROCESS TECHNOLOGY

Wafer / Chip



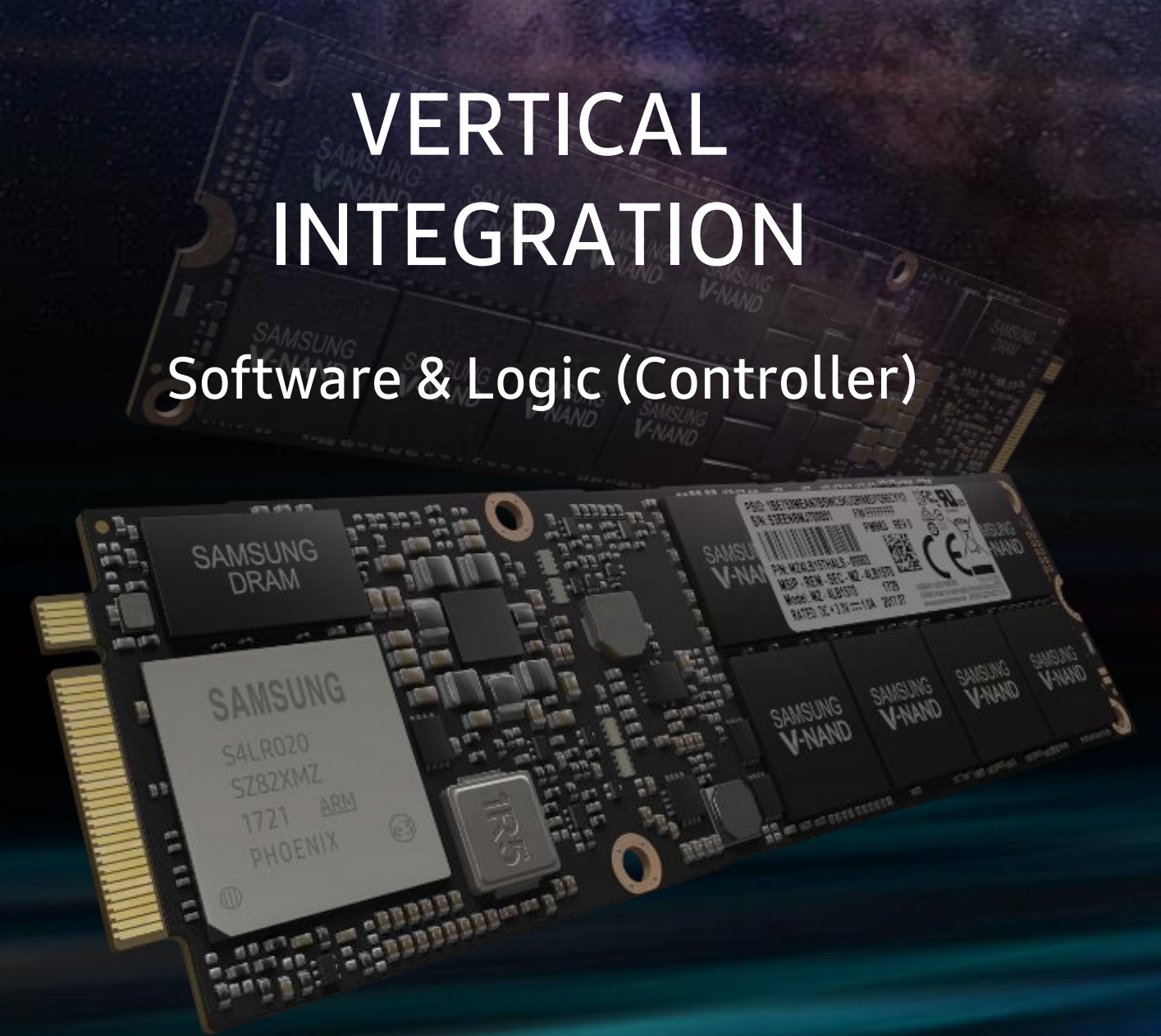
## ADVANCED PACKAGING TECHNOLOGY

Stacking / TSV



## VERTICAL INTEGRATION

Software & Logic (Controller)



Smaller



Higher Density



Less Power Consumption



Faster



Thinner



Smaller



No Performance Loss



Customized



Expandable



Smarter

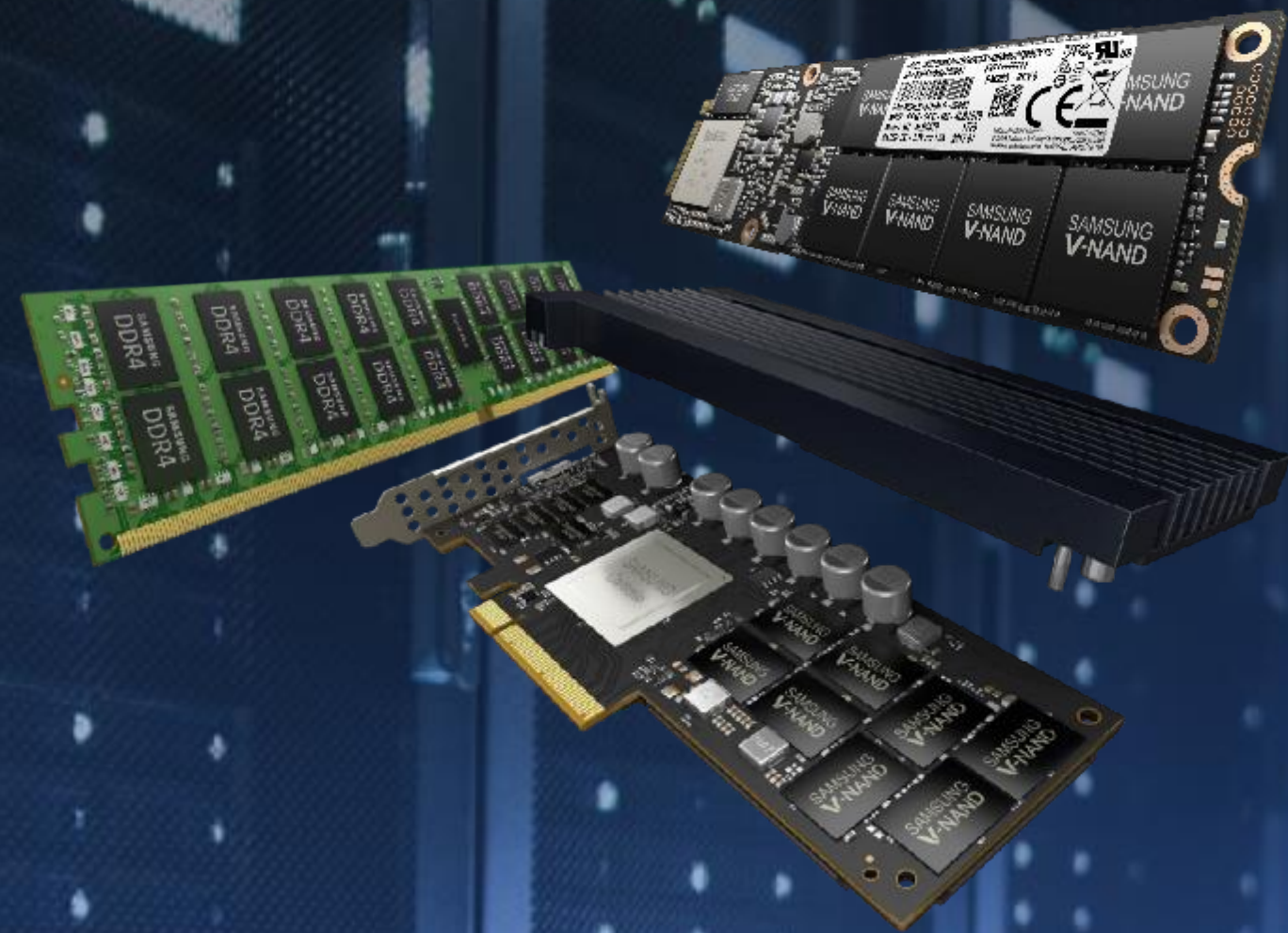


Secure



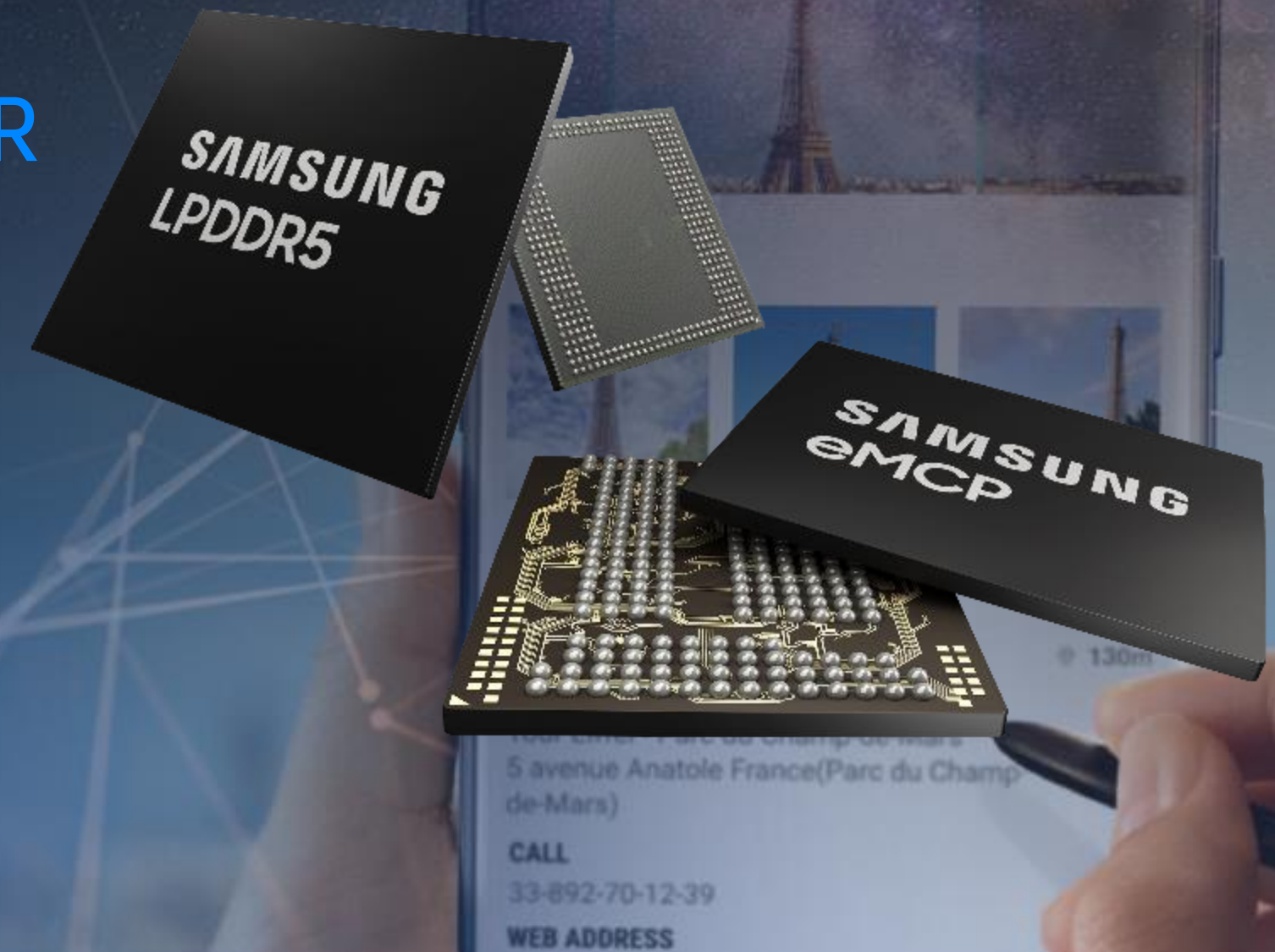
# SAMSUNG SOLUTIONS FOR THE 5G ERA

Enhanced Processing for Massive Data with Lower Latency & Less Power Consumption



FASTER DATA RATES WITH LOW POWER

# 5G



## TSV RDIMM, Z-SSD & NF1

Low Latency\*

High Capacity

Stable QoS

## LPDDR5

Higher Speed

Lower Power Consumption

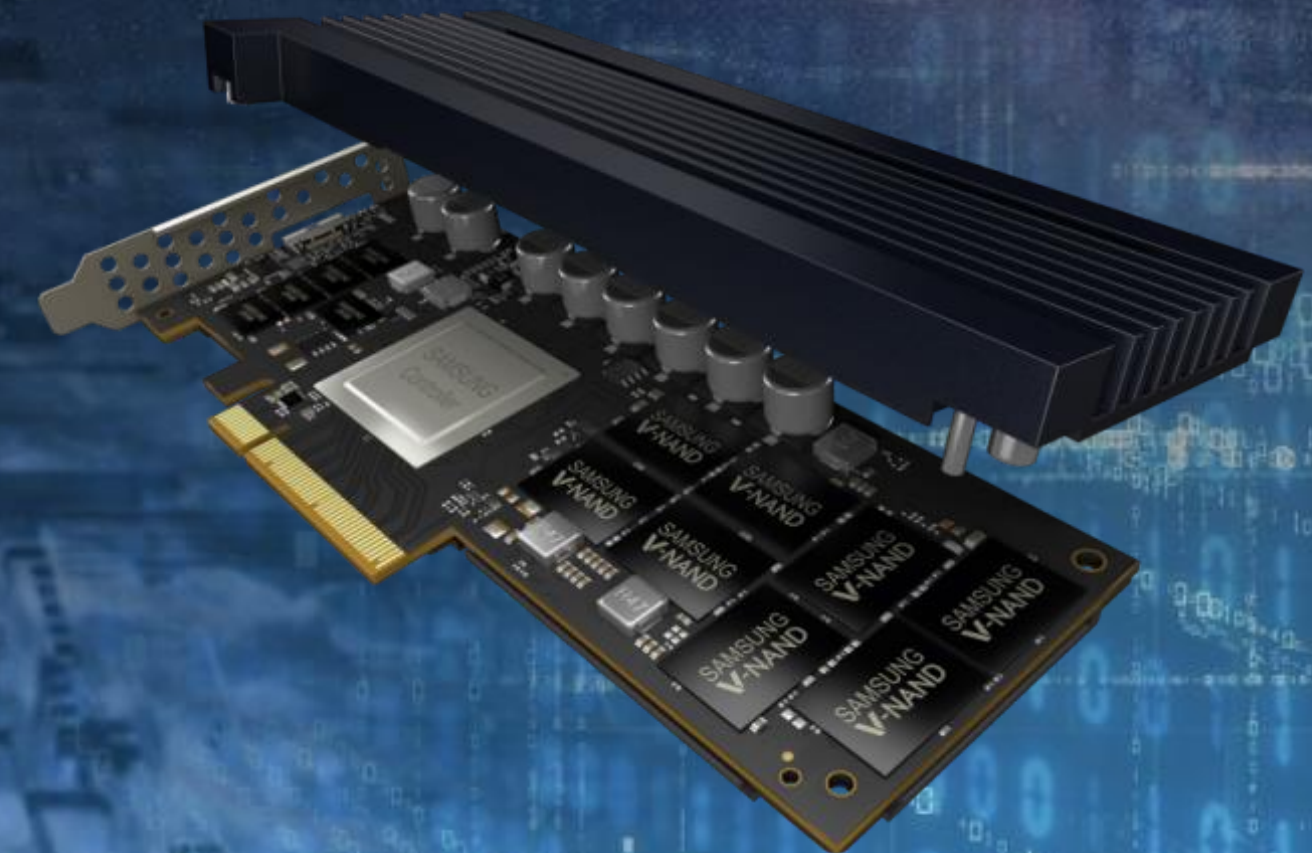
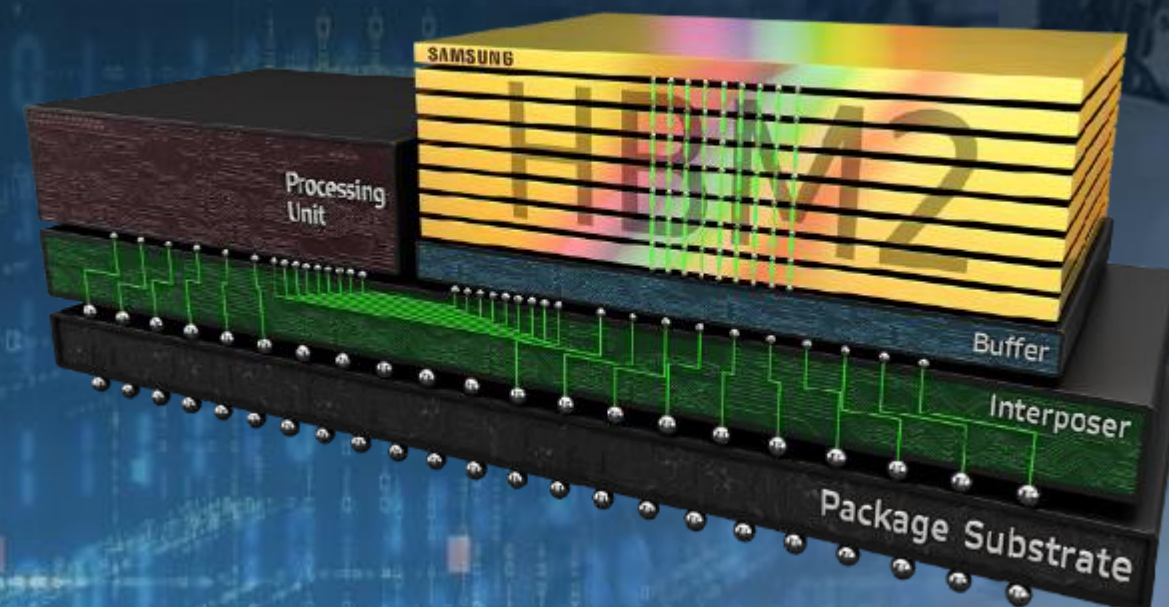
Smaller Package

\* Latency: Time Delay between input and output in a system

# SAMSUNG SOLUTIONS FOR ARTIFICIAL INTELLIGENCE

Superlative Performance and High Reliability Using Less Energy

ENHANCED PERFORMANCE  
FOR DATA-INTENSIVE TASKS



8GB HBM2\*

Fastest Performance

Energy Efficiency

32TB SAS SSD, 16TB NVMe SSD

Largest Density

Higher Reliability

Unparalleled Performance

\* HBM: High Bandwidth Memory

# SAMSUNG SOLUTIONS FOR AUTOMOTIVE INDUSTRY

Advanced Total Memory Solution for Automotive Applications & Connected Car

Dedicated Support for automotive

Diverse Memory Line-ups

Dedicated Manufacturing Line & Organization

ELECTRIFIED



CONNECTED



AUTOMATED



## Automotive eStorage

High Density

Temperature Notification

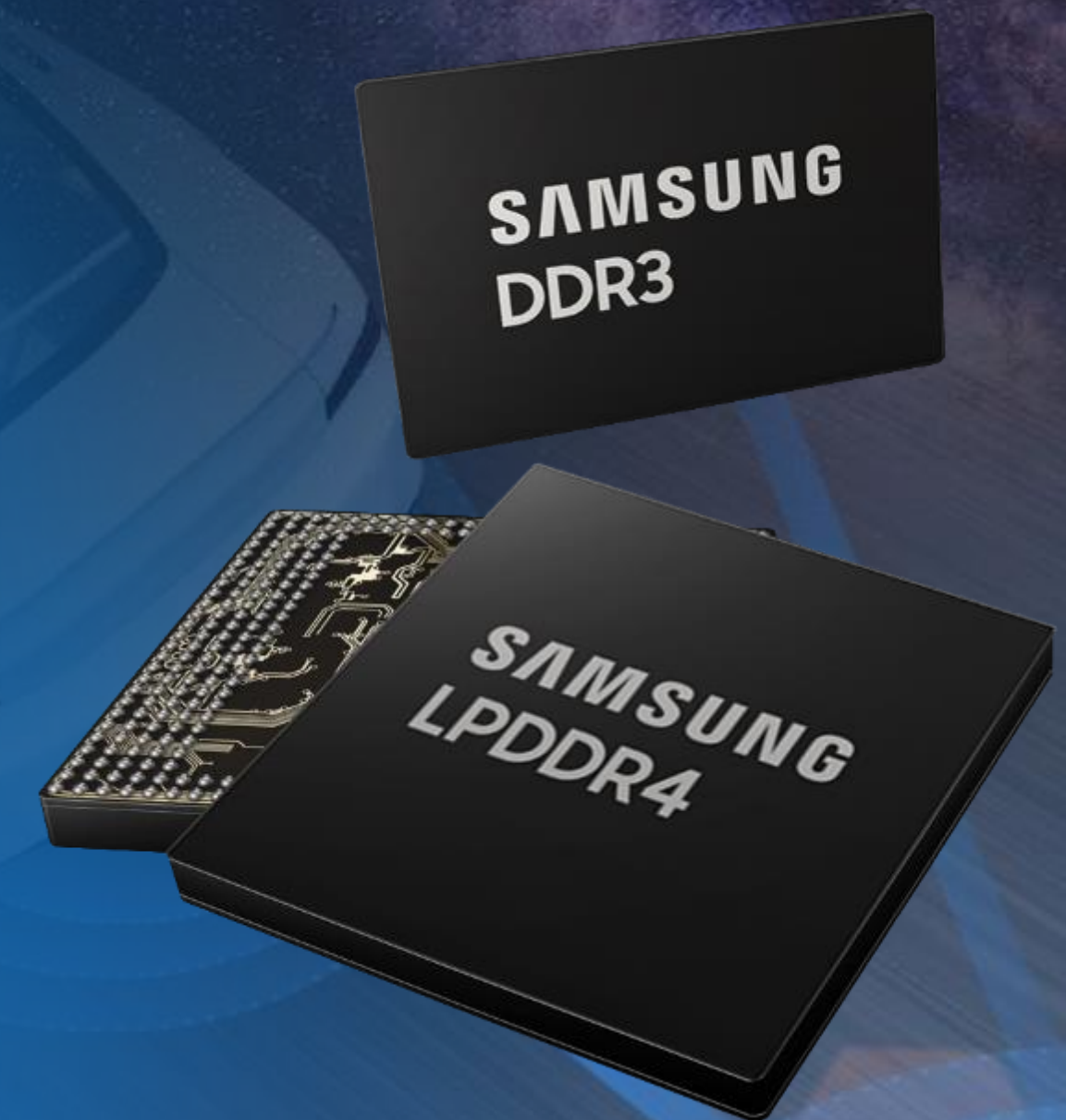
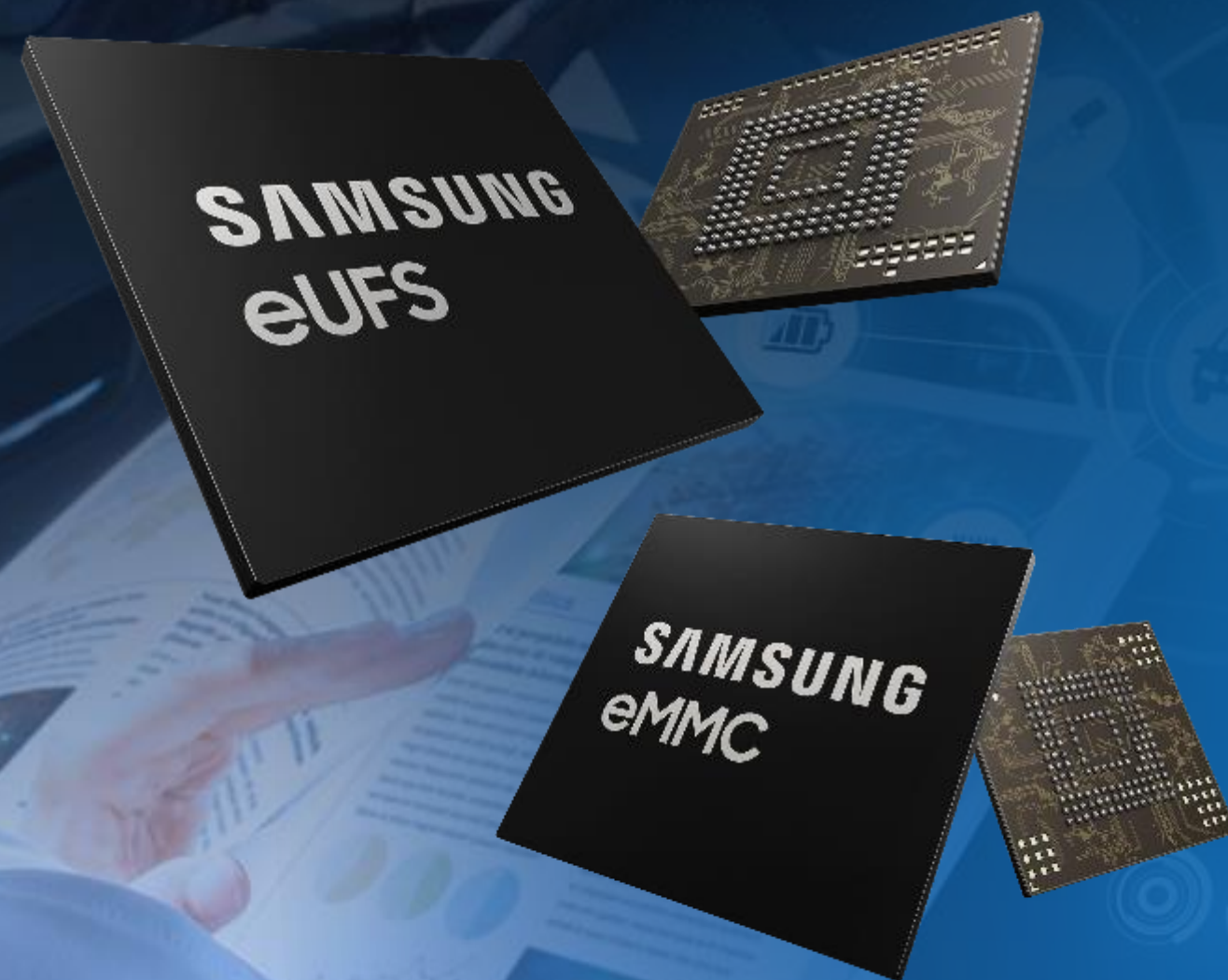
Data Refresh

## Automotive DRAM

High Bandwidth

Lower Power Consumption

Higher Reliability



# APPLICATION-ORIENTED LINE MANAGEMENT

## 2-Track Strategy for Efficient Production & Capacity Allocation

ARTIFICIAL  
INTELLIGENCE

HIGH  
PERFORMANCE  
COMPUTING

AUTOMOTIVE

INDUSTRIAL

NETWORK

**PERFORMANCE**  
Leading Process Technology

**FLEXIBILITY**  
DRAM/NAND Conversion

**LONGEVITY**  
Proven Process Technology

# EVOLUTION TO SMARTER FACTORY

Customer Value Improvement through High Productivity and Enhanced SCM\*

SCM

PRODUCTIVITY



\* SCM: Supply Chain Management

# QUALITY BY DESIGN

Exceed the Industry Standard and Expectation of AI & Automotive Customers



# Placing Memory at the Forefront of Future Innovation and Creative IT Life

## Technology

Leading Technological Breakthroughs

## Customers

Supporting Customers' Future Innovation

## Employees

Fostering Employees' Creativity

## Society

Enriching a New Way of Digital Life