SAMSUNG

Memory Evolution through Open Source Collaboration

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OCP KOREA

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SEOUL, KOREA

Leading the Journey Into Open Source

Poseidon Project

F2FS

Multi-Stream

Open MPDK

Mission Peak

Poseidon V1

Poseidon V2

Poseidon OS

Poseidon Contribution

2015-2018

2019

2020

2021

2022

Community Member

Silver Member

Gold Member

Future Technology Initiative

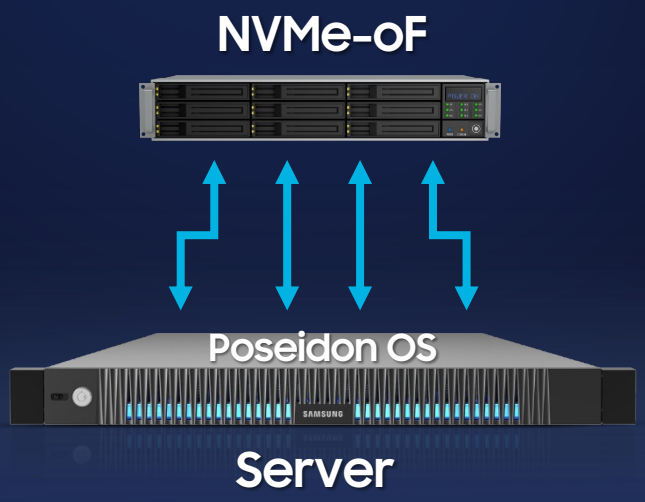
Platinum

Poseidon V1 Spec. Contribution

Support the full lineup of
EDSFF form factors

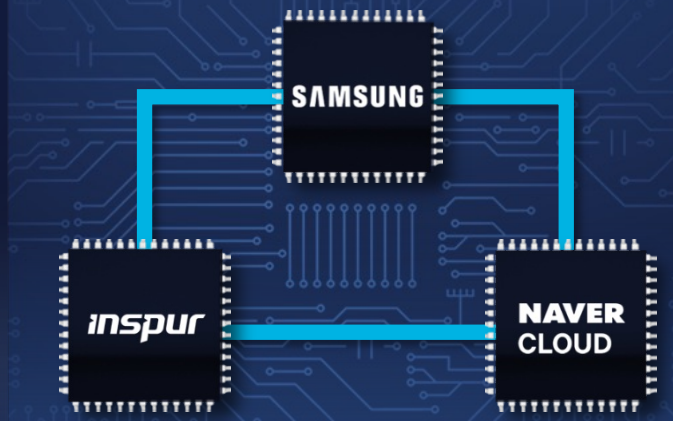
Poseidon Project

- Leading the way toward innovative storage solutions built on open source



Poseidon V1

E1.S SSD Ref.system

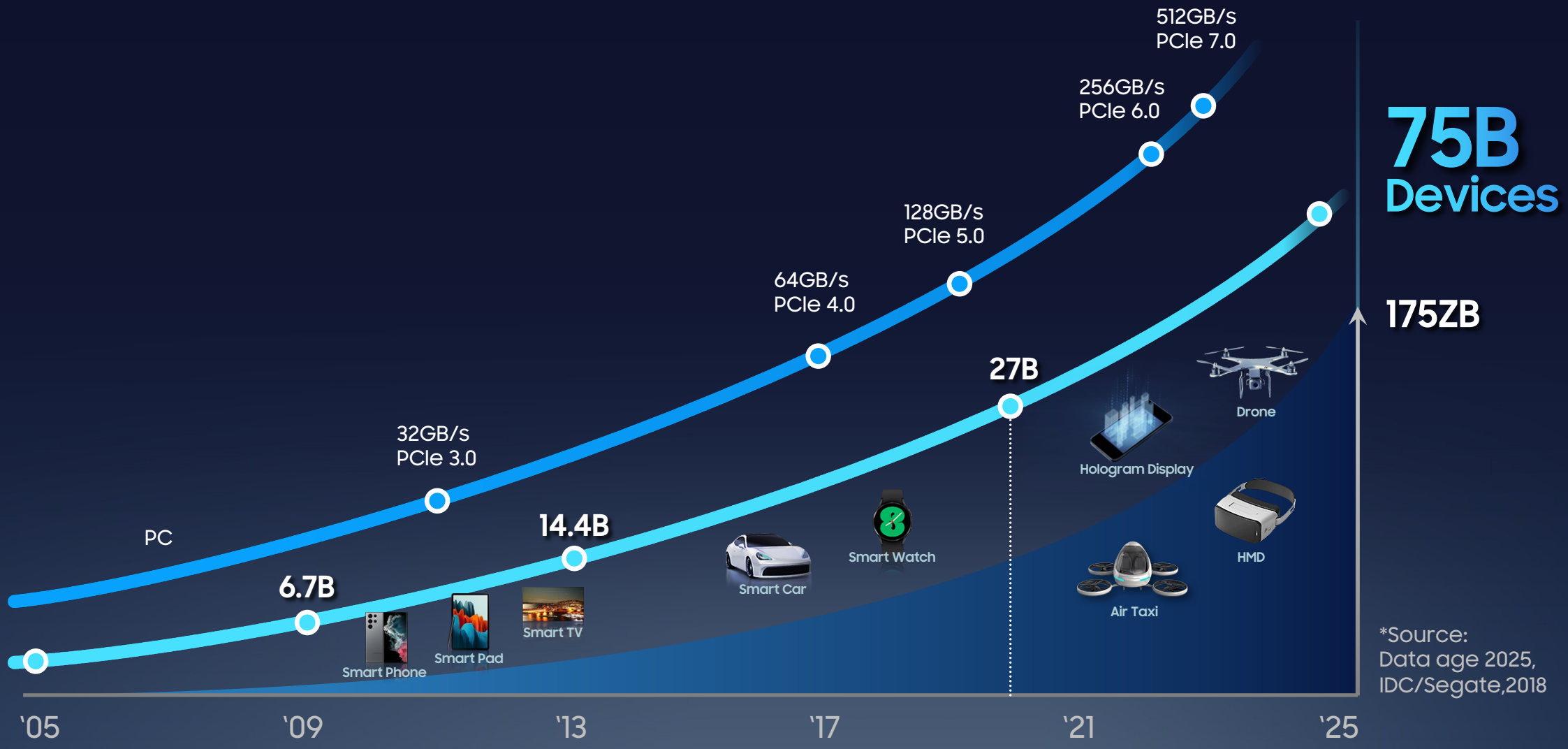


Multi-industry collaboration

Open Source contribution

Samsung's Breakthrough Memory Solutions for Big Data

The Advent of the Data Age

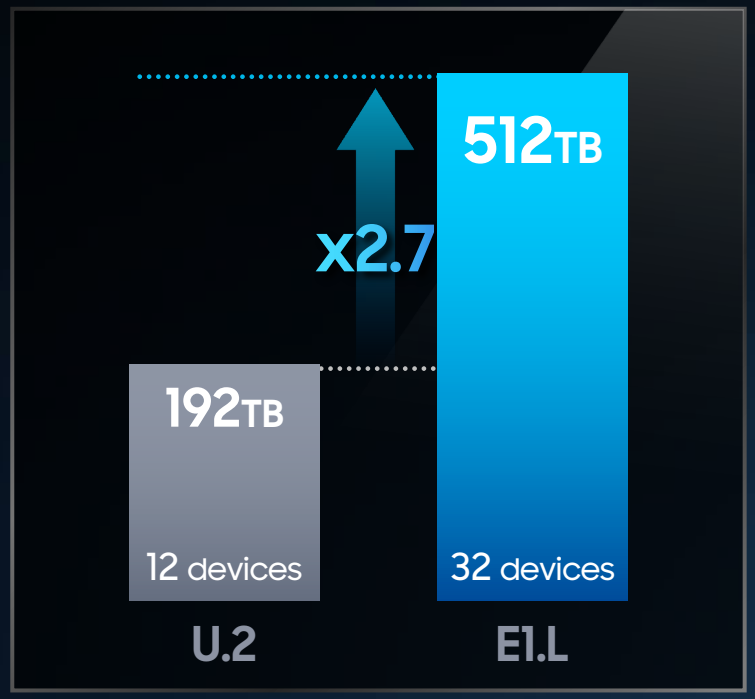


*Source:
Data age 2025,
IDC/Segate,2018

New Standard Form Factor for Space & Power Efficiency

E1 optimized to 1U system

- Max 32 devices of 1U
- PM9A3 16TB x 32 (512TB)

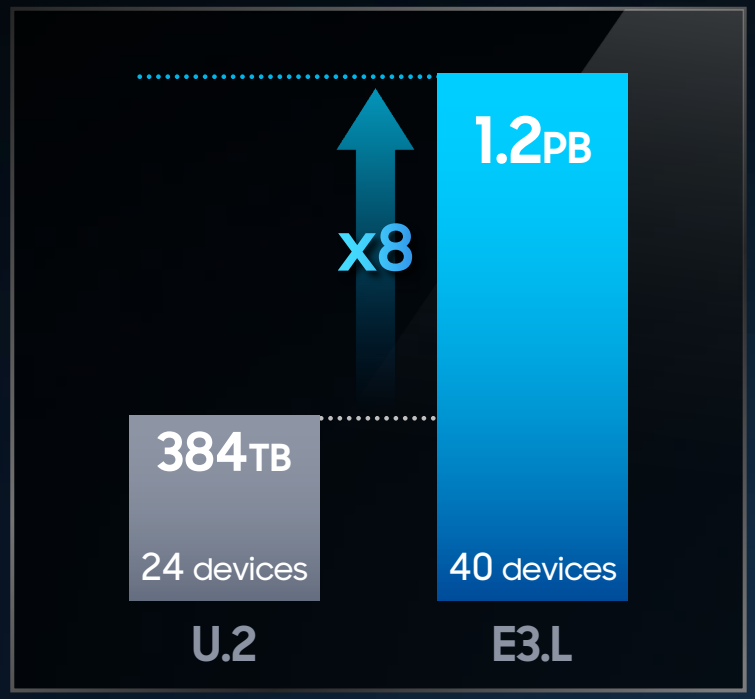


* E1.S 32 devices

New Standard Form Factor for Space & Power Efficiency

E3 optimized to 2U system

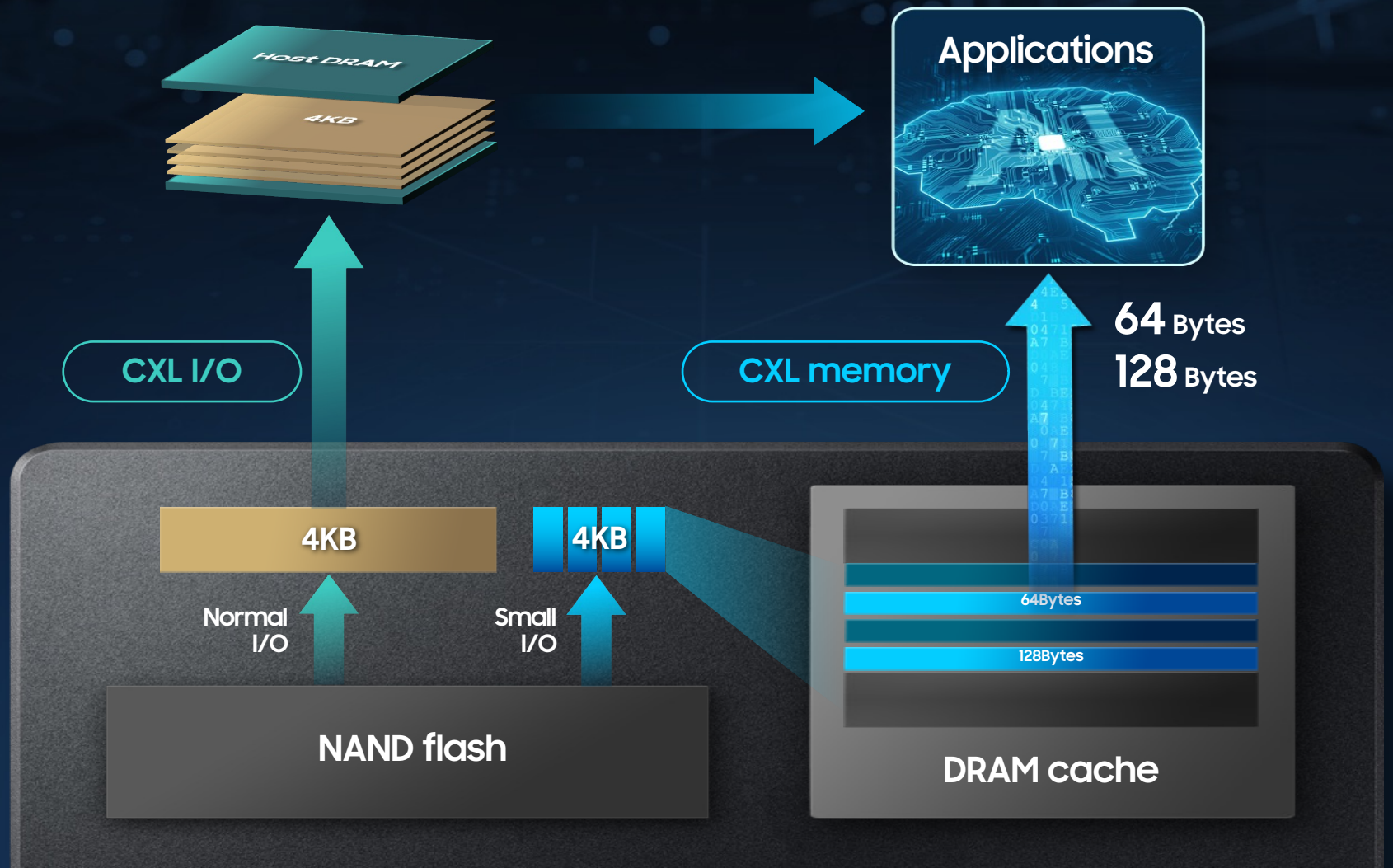
- Max 40 devices of 2U
- PM1743 32TB x 40 (1280TB)



* E3.L 40 devices

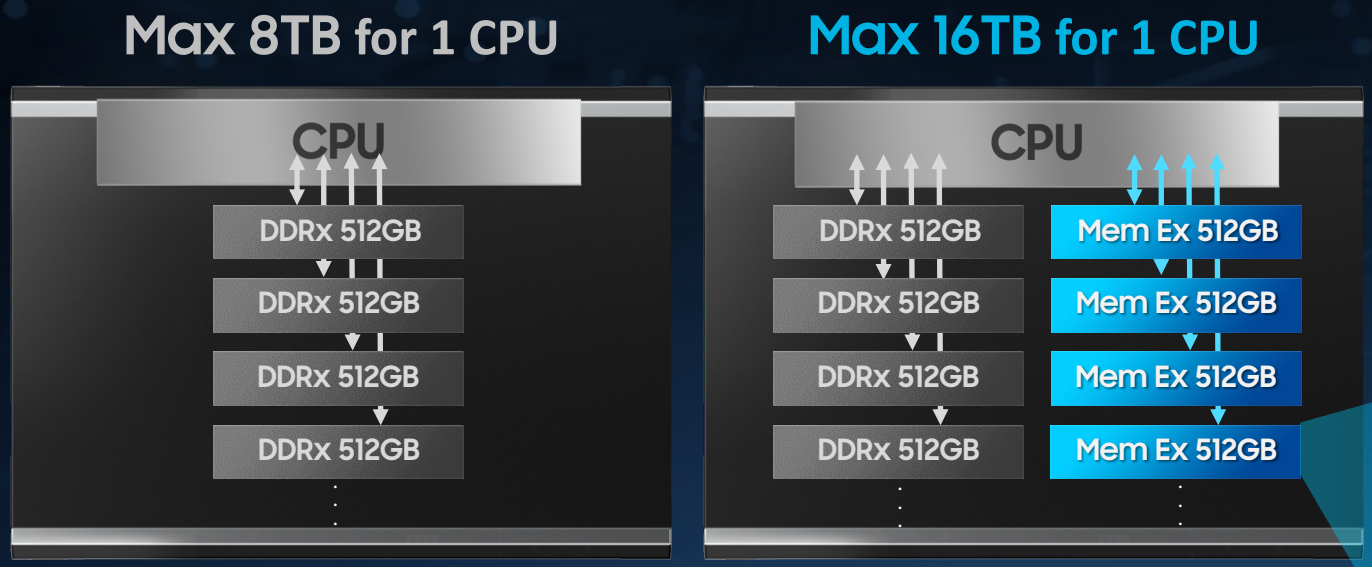
Memory-Semantic SSD

- Optimized for small-unit access to data stored in NAND to increase efficiency
  - 20x better random read/write performance *compared to conventional SSDs



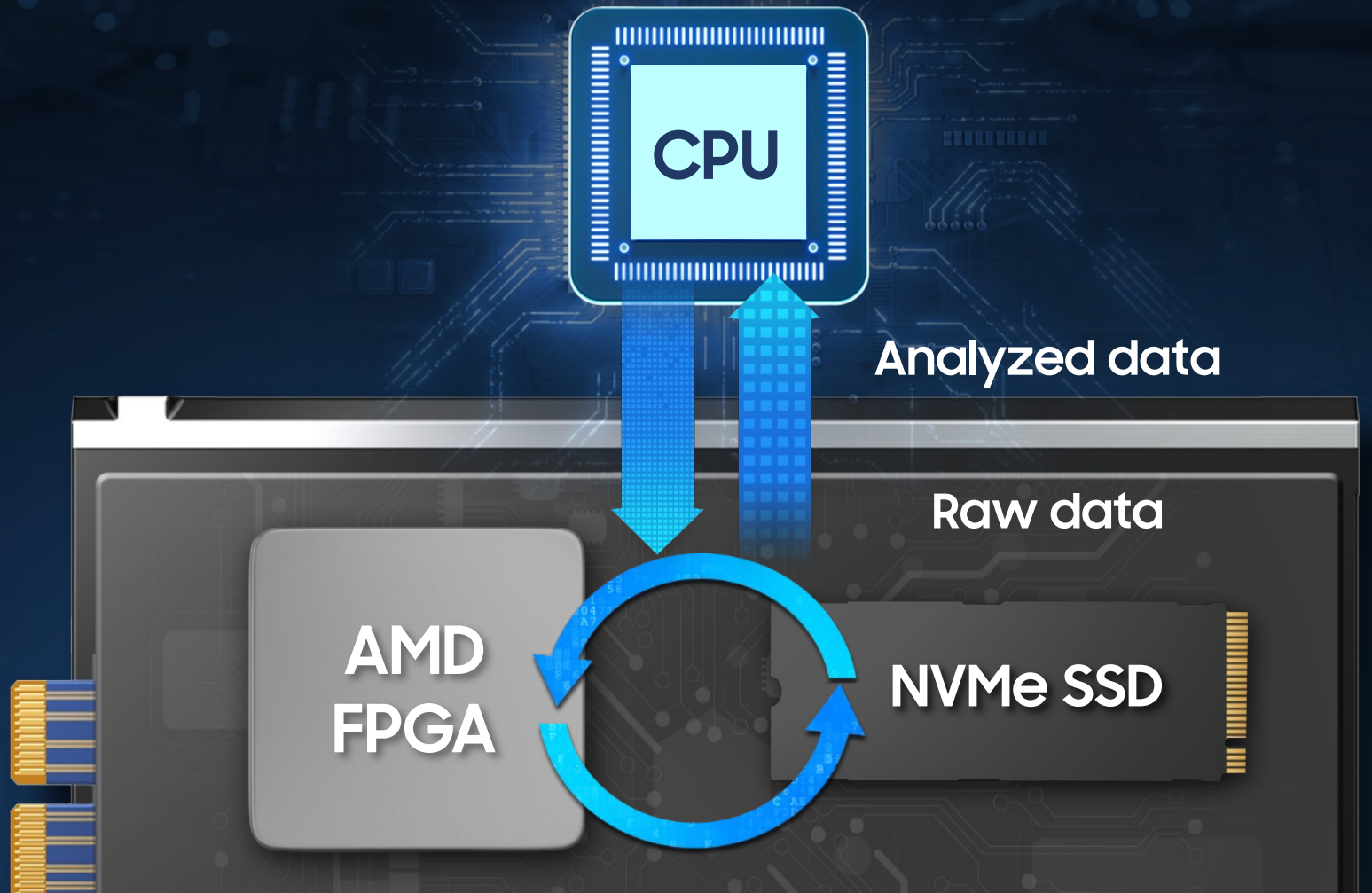
Memory Expander

- Enables a server to expand its memory capacity to tens of TBs
  - 2x larger memory capacity *may vary depending on system configuration



2nd Gen. SmartSSD

- **Saves energy with novel near-data-processing hardware and software**
  - Cuts energy consumption by up to 70%, CPU utilization by up to 50% *compared to conventional SSDs



Storage sub-system Solutions

Pushing EDSFF E3 to the MAX Poseidon V2

PCIe 5.0-based open HW technology
Higher performance

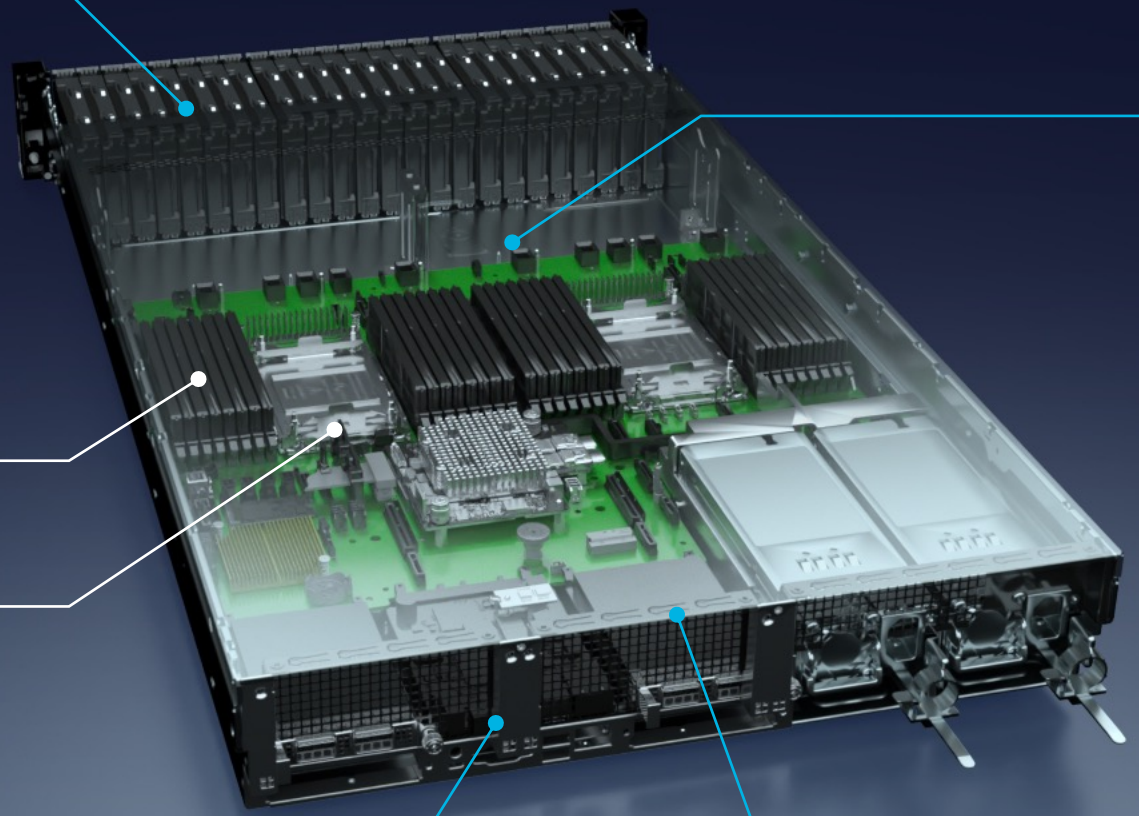
EDSFF E3 reference
More capacity

Two types of servers

Poseidon V2

Detailed components of Poseidon V2

- Packed with innovative technologies and dynamic components



OPEN Compute Project

Composable Architecture of Poseidon v2

High-performance Shared storage

E3.S SSD X 24

High memory server For cloud service

Memory Expander + SSD

Accelerator server For AI/ML

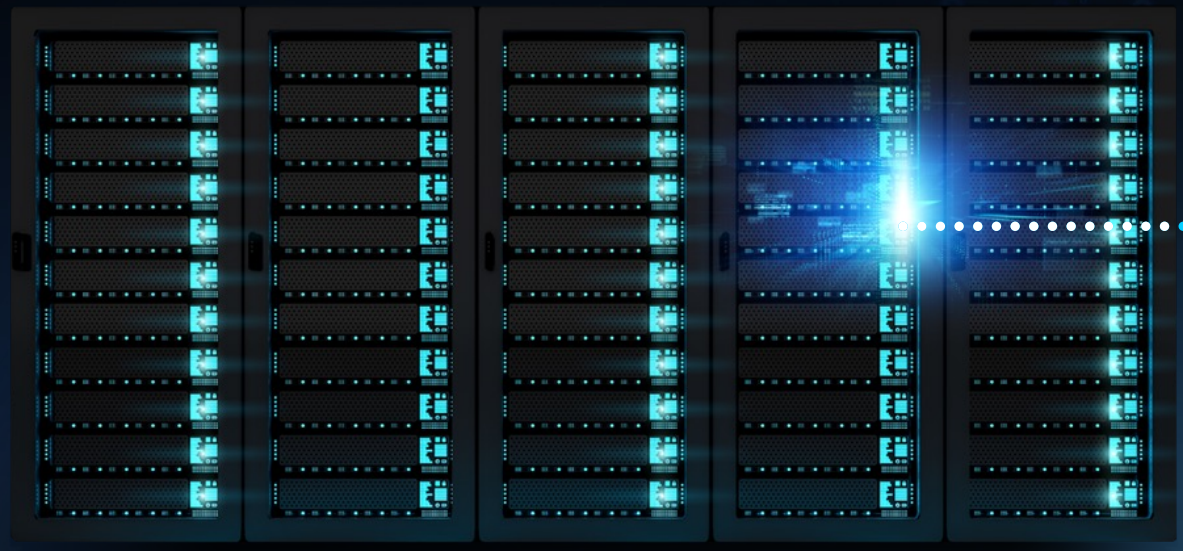
Smart SSD / Memory-semantic SSD X 8

High density server For archiving

128TB ZNS QLC

Petabyte SSD (PBSSD)

- Disaggregated NVMe subsystem with QLC SSDs increases rack-scale space and power efficiency
- Building block for a super high-density storage system



Exabyte scale storage system

1PB disaggregated storage Box

Space efficiency I Power efficiency I High performance

Collaboration is the Future of Memory Solutions

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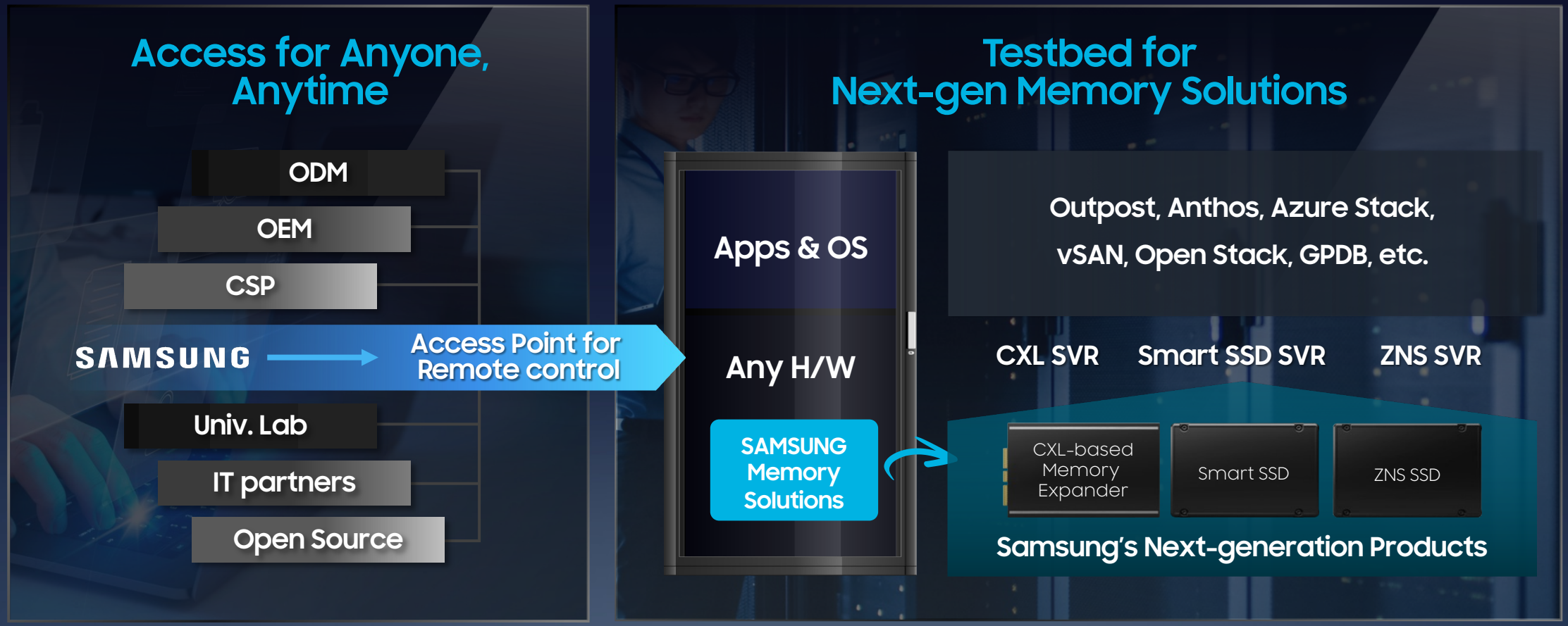
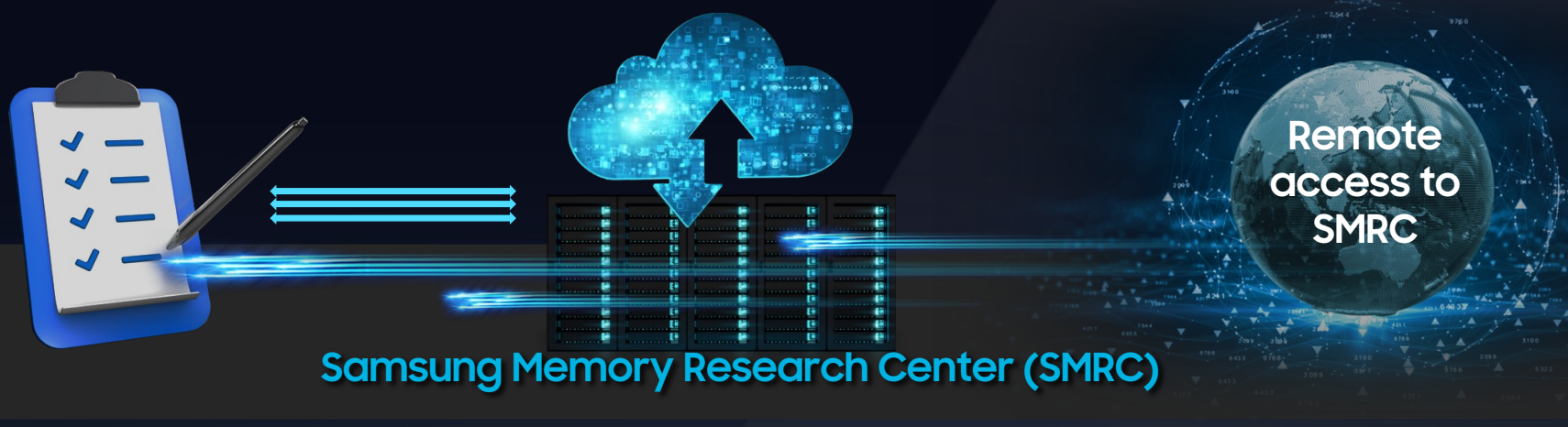
Key features of SMRC



Collaboration is the Future of Memory Solutions

Connecting the blocks for the future

Benefits for our customers



Real-time Validation	Fast PoC	Co-promotion
• Real time validation of device solution change	• Fast Track PoC support	• Establish ref. architectures and papers

Making Future Data Centers More Sustainable through the Manufacturing Process

Manufacturing: Less Carbon, More Reusable Energy

- Using RCS (Regenerative Catalytic System) to reduce process gas, air pollutants

Process Gas

Treating process gas via RCS

Reducing process gas usage

Developing alternative gas

- Rooftop facility applying a catalyst
- Industry's 1st and only integrated greenhouse gas treatment facility
- Lower emission of air pollutants*

*compared to Point of Use (POU) facilities

up to 95% processing efficiency

by developing a more durable catalyst for RCS

Electricity

Using renewable energy

High-efficiency facilities

RE100

CLIMATE GROUP | CDP

Waste Management: Zero Waste by 2025

- Obtaining Platinum validation for Zero Waste to Landfill for all global sites

By 2025, we will obtain Platinum validation
at each of our global semiconductor sites

We have achieved a 100% rate for recycled waste on all domestic sites

Gold
(95~99% waste diversion)

Platinum
(100% waste diversion)

*Excludes waste designated for landfill by law
(ex: medical waste)

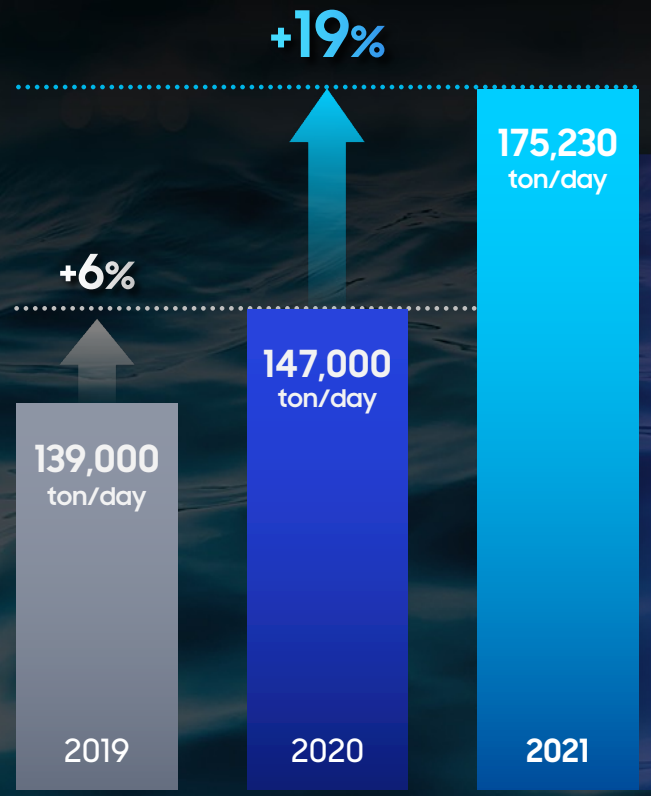
2022

Water Management: Reduce, Reuse, Recycle

- Improving water management and setting purification process

Water reuse

* Reduce Reuse Recycle



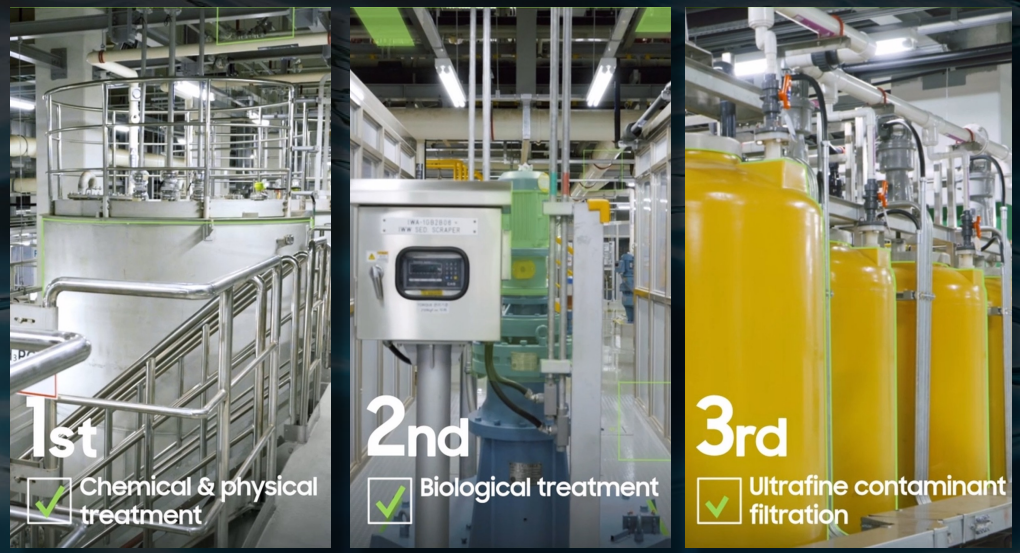
Structural improvement

- Manufacturing process upgrades
- Set up recycling system

* at domestic manufacturing sites

Advanced purification system

- Water used in manufacturing are classified into six categories and purified with matching techniques for each type



Industry's First "Triple Standard"

- Certified sustainable efforts across the entire process of manufacturing

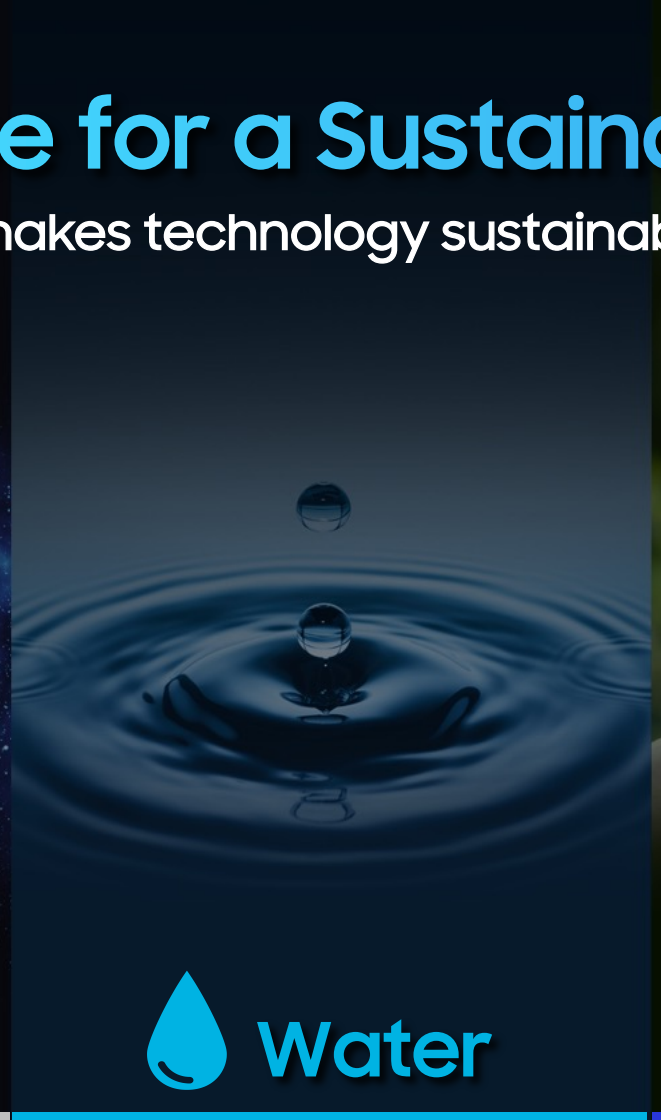
Awarded the Triple Standard for carbon, water and waste by the Carbon Trust

Our Promise for a Sustainable Future

- Technology that makes technology sustainable

Carbon

Net zero
by **2050**



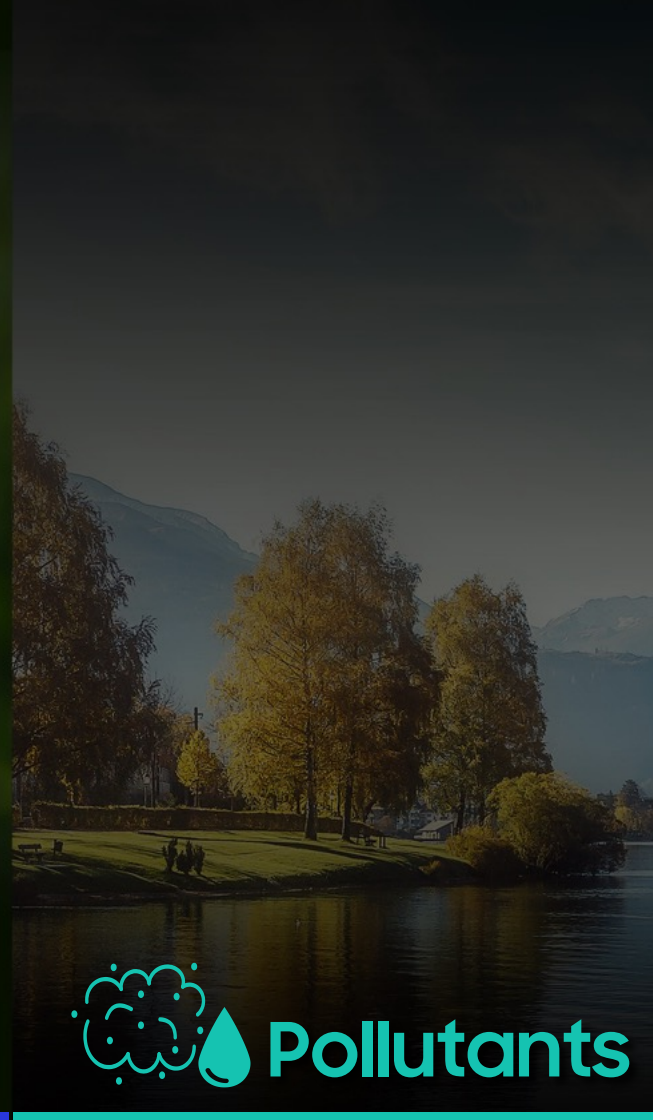
Water

Keep water withdrawal
to **2021** levels in **2030**

2021 water withdrawal = 2030 water withdrawal

Waste

99.9%
Waste Recycling by **2030**



Pollutants

Air/water pollutants
in **natural state** by **2040**

*Air = natural atmosphere
Water quality = upper stream level

SEPI: New Environmental Management Guidelines

- Developed the Semiconductor Environmental Performance Index (SEPI) to provide guideline for implementing stricter sustainability policies

SEPI: Evaluation system

Semiconductor's contribution to green efforts	40%
Environmental management in the supply chain	20%
Green manufacturing efforts at production sites	40%
User environment benefits	+5%

Next Steps

- Overcome the limitations of existing ESG evaluations
- Help more companies implement stricter environmental policies in a principled manner
- Appeal to the eco-friendly efforts of the semiconductor industry

Criteria for customer choice
Standard for investor evaluations

Reducing Emissions through Industry Cooperation

- Working with various stakeholders to ensure our product are being designed, manufactured, supplied and used in an environmentally conscious manner

SEMI Sustainability Summit

- First run in San Francisco in July 2022
- Share the methods and cases to reduce GHG emissions with the companies and suppliers in semiconductor industry
- Plan to participate the industry-wide efforts to reduce greenhouse gas emissions

with **Supply chain**

OCP Sustainability Initiative

- Initiative design system and parts that can be reused for users
- Share standards for LCA assessment of semiconductor usage stage
- Develop design and sourcing methods for circular economy of Data center

with **End-user**

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