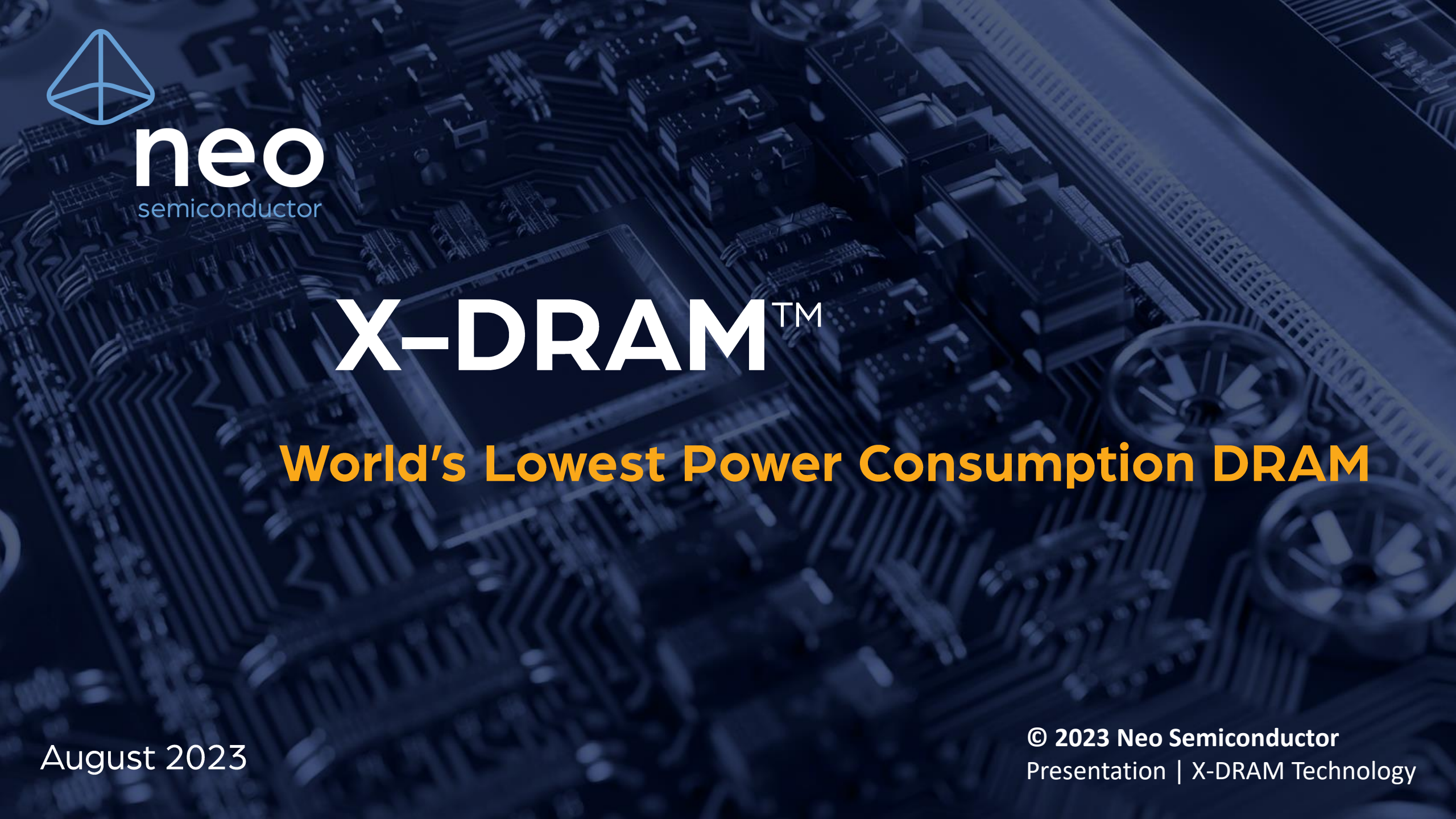


neo semiconductor

X-DRAM™

World's Lowest Power Consumption DRAM

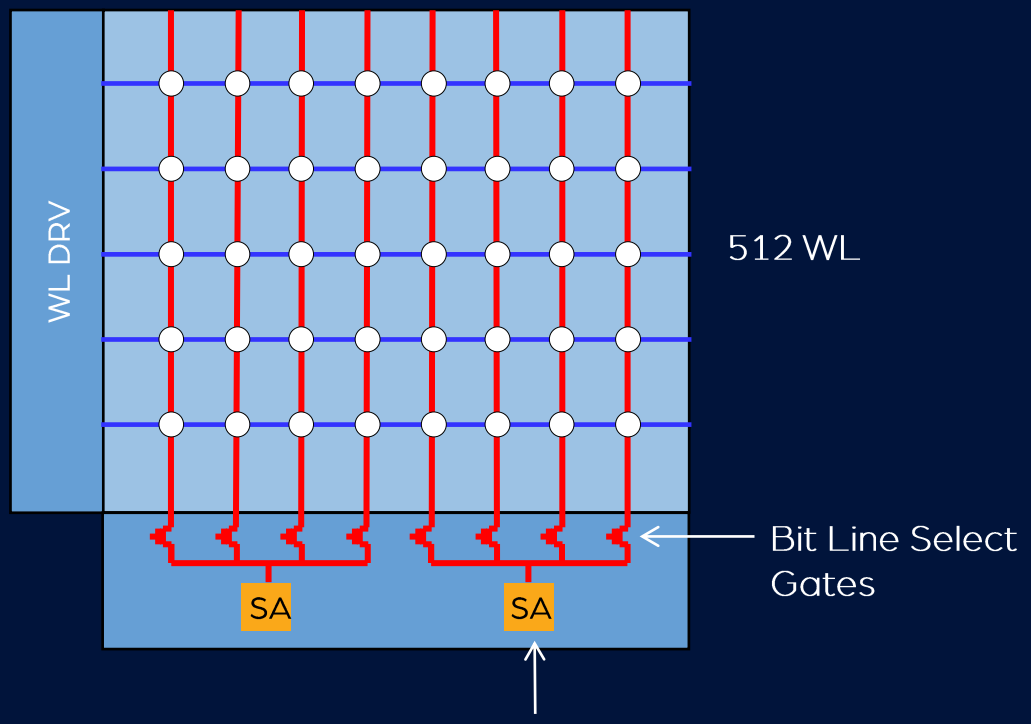
August 2023

Presentation | X-DRAM Technology

X-DRAM™

FMS 2022

World's Lowest DRAM Power Consumption



15%

Refresh Power Consumption

25%

Bit Line Power Consumption

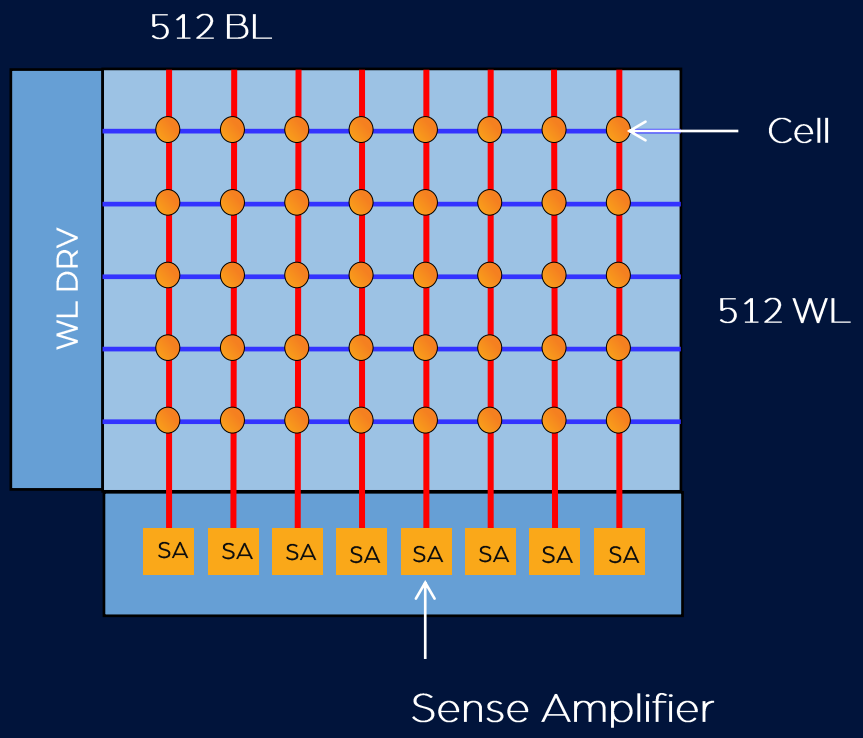
0%

Cost Increase

DRAM vs. X-DRAM

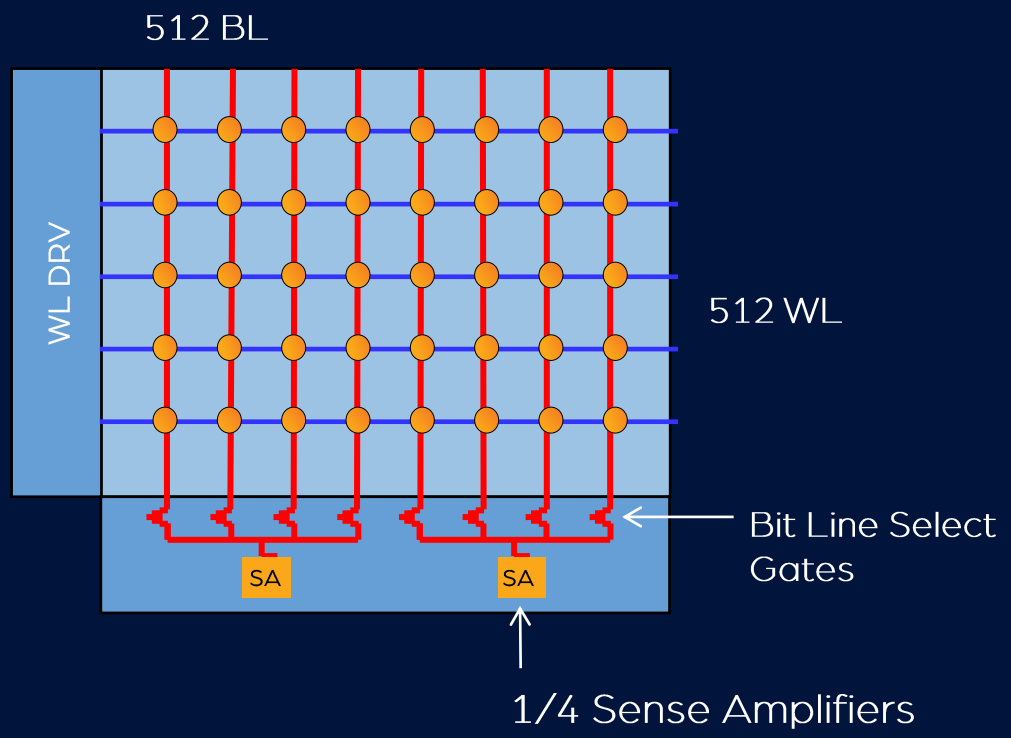
Conventional DRAM

Dedicated Sense Amplifiers



X-DRAM

Shared Sense Amplifiers



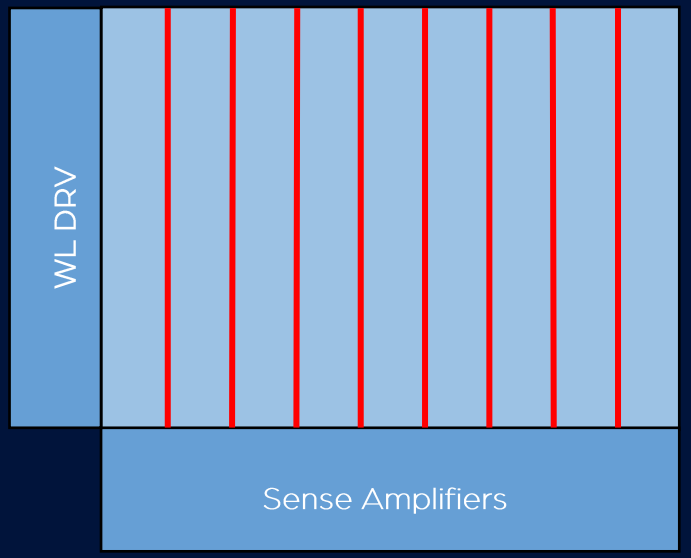
Shared Sense Amplifiers reduces layout size to 25%

DRAM vs. X-DRAM

Architecture

Conventional DRAM

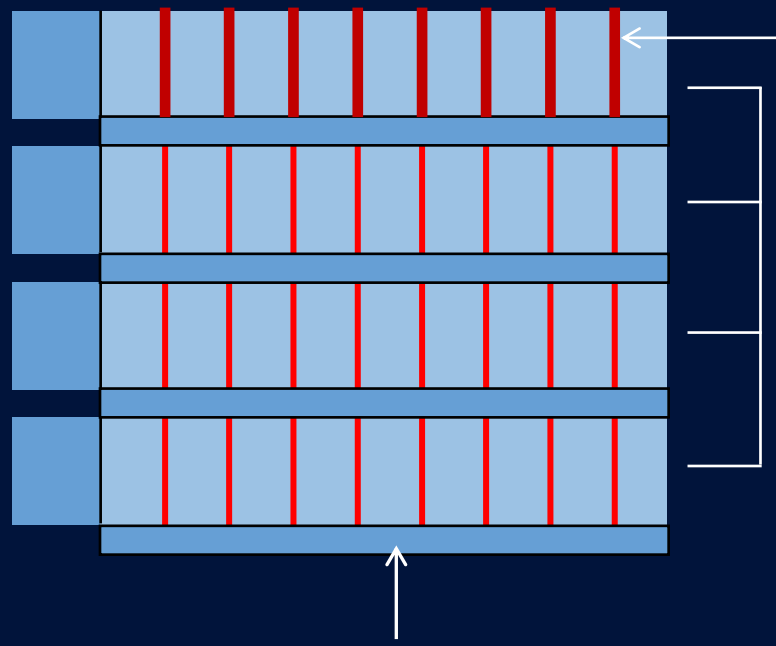
Dedicated Sense Amplifiers



Same
Die Size

X-DRAM

Shared Sense Amplifiers

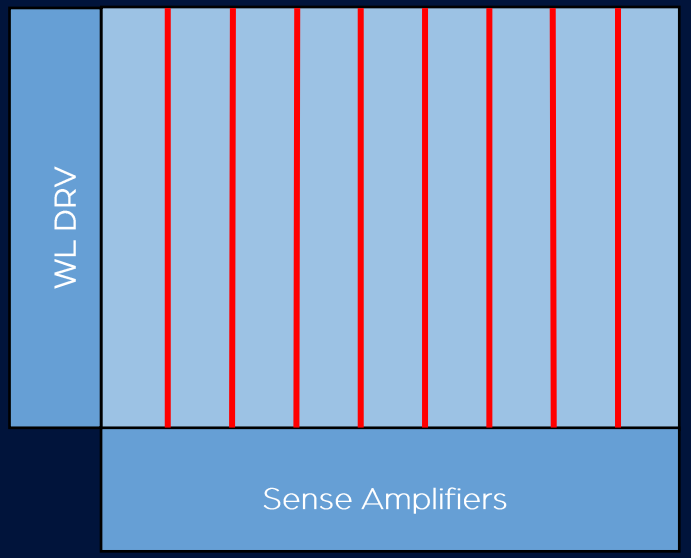


DRAM vs. X-DRAM

Architecture

Conventional DRAM

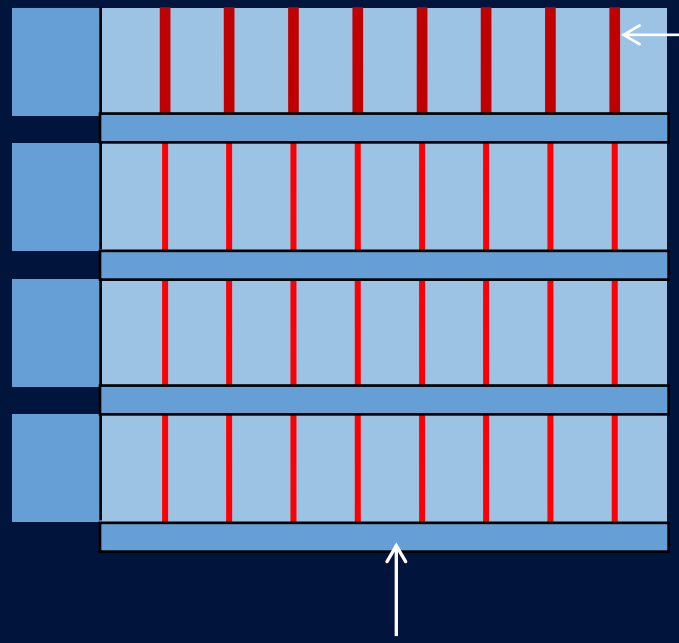
Dedicated Sense Amplifiers



Same
Die Size

X-DRAM

Shared Sense Amplifiers



25%

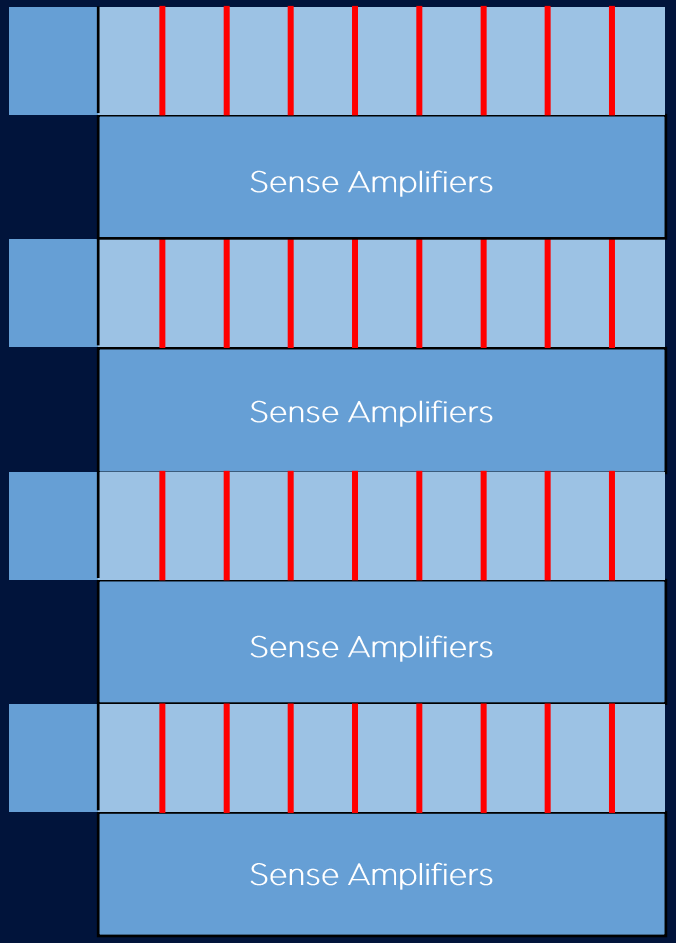
BL Delay

BL Power
Consumption

Refresh Time

DRAM vs. X-DRAM

Conventional DRAM



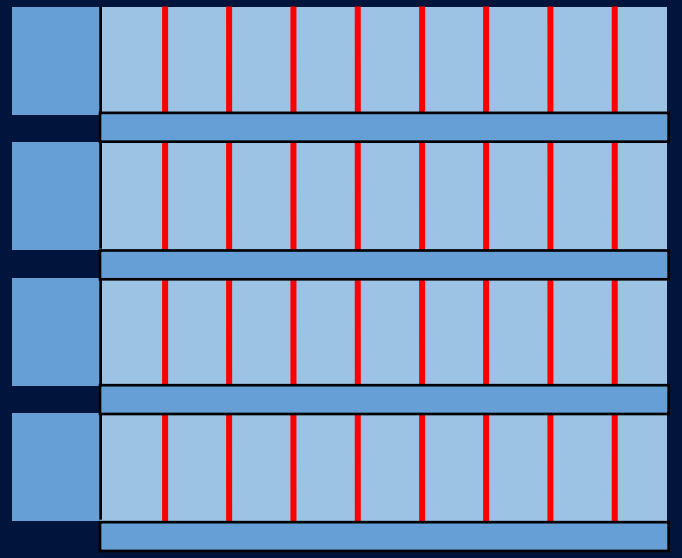
4 planes

X-DRAM

4 planes: Increase die size to 160%

8 planes: Increase die size to 240%

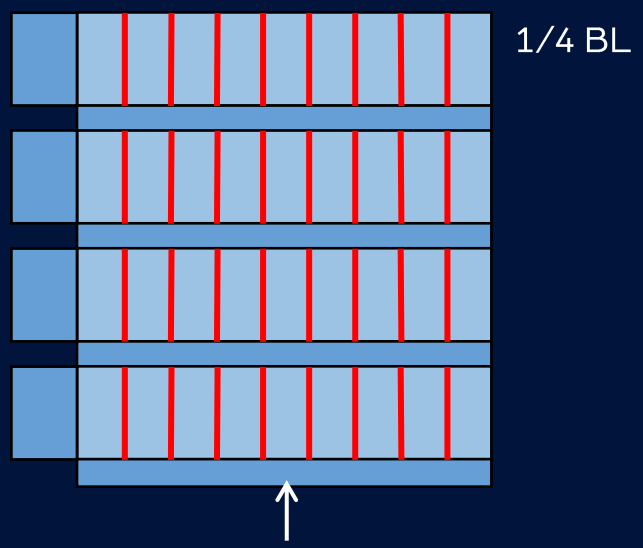
16 planes: Increase die size to 300%



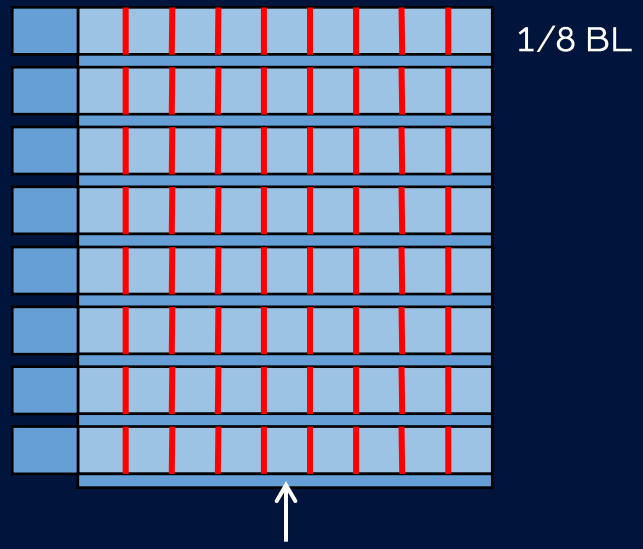
4 planes

X-DRAM Architecture

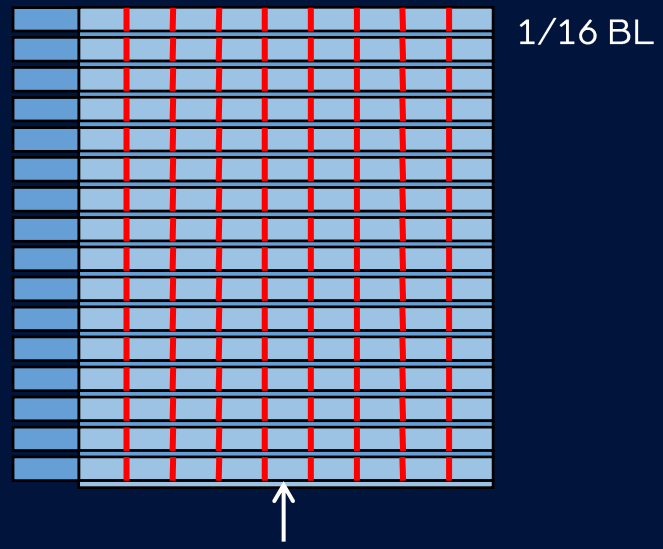
4X



8X



16X



X-DRAM can be partitioned to various plane numbers without increasing die size.

X-DRAM Advantages (4X)

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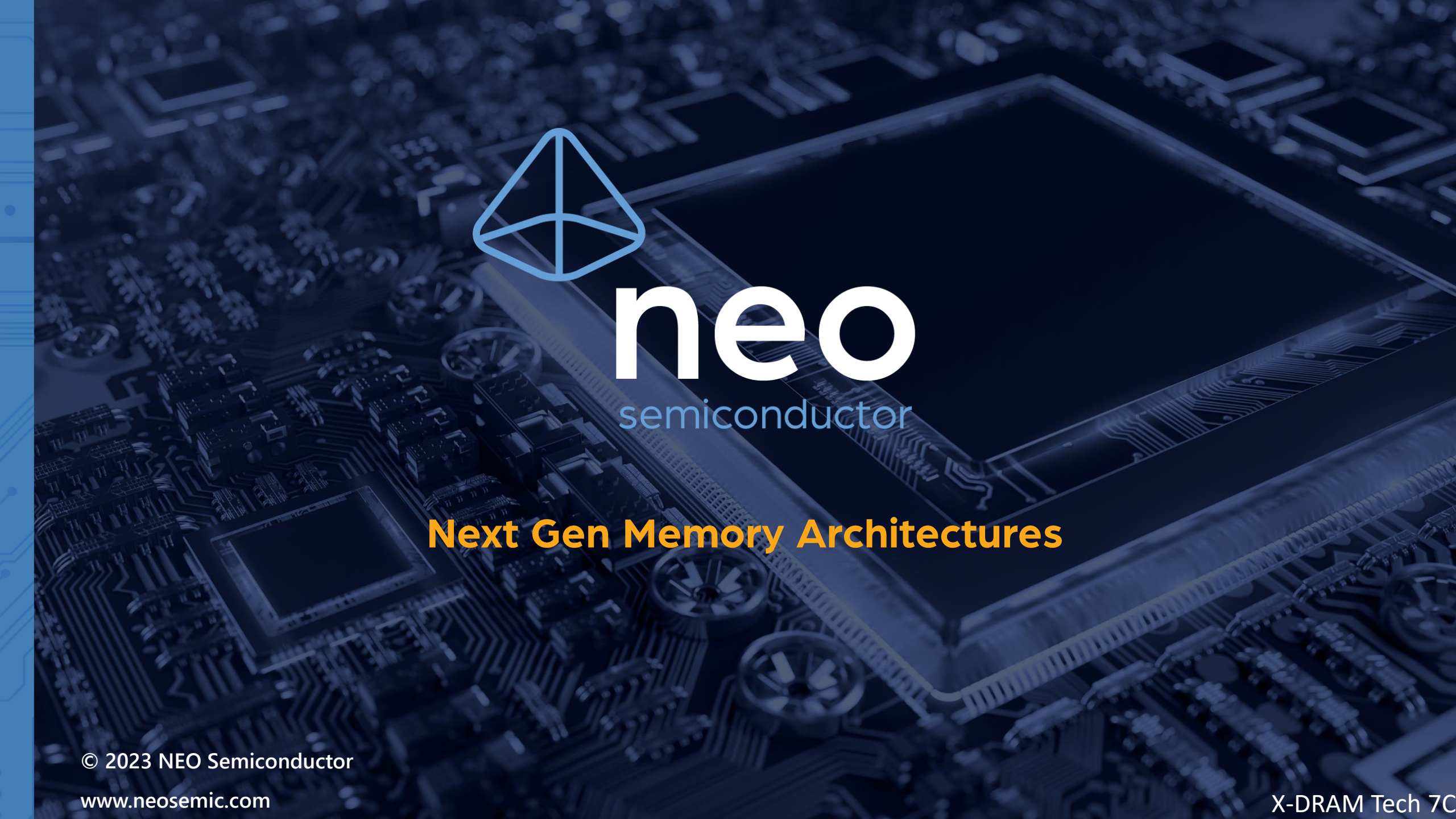
Advantage

FASTER PERFORMANCE	**50%** Activation Latency	**400%** Refresh Data Throughput	**25%** Refresh Time
LOWER VOLTAGE	**4X** BL Charge-Sharing Voltage Margin	**75%** Min. Cell Capacitor Voltage	**75%** Lower VDD Voltage
REDUCED POWER	**25%** BL Power Consumption	**50%** Refresh Frequency	**15%** Refresh Power Consumption

* Based on simulation



Next Gen Memory Architectures