

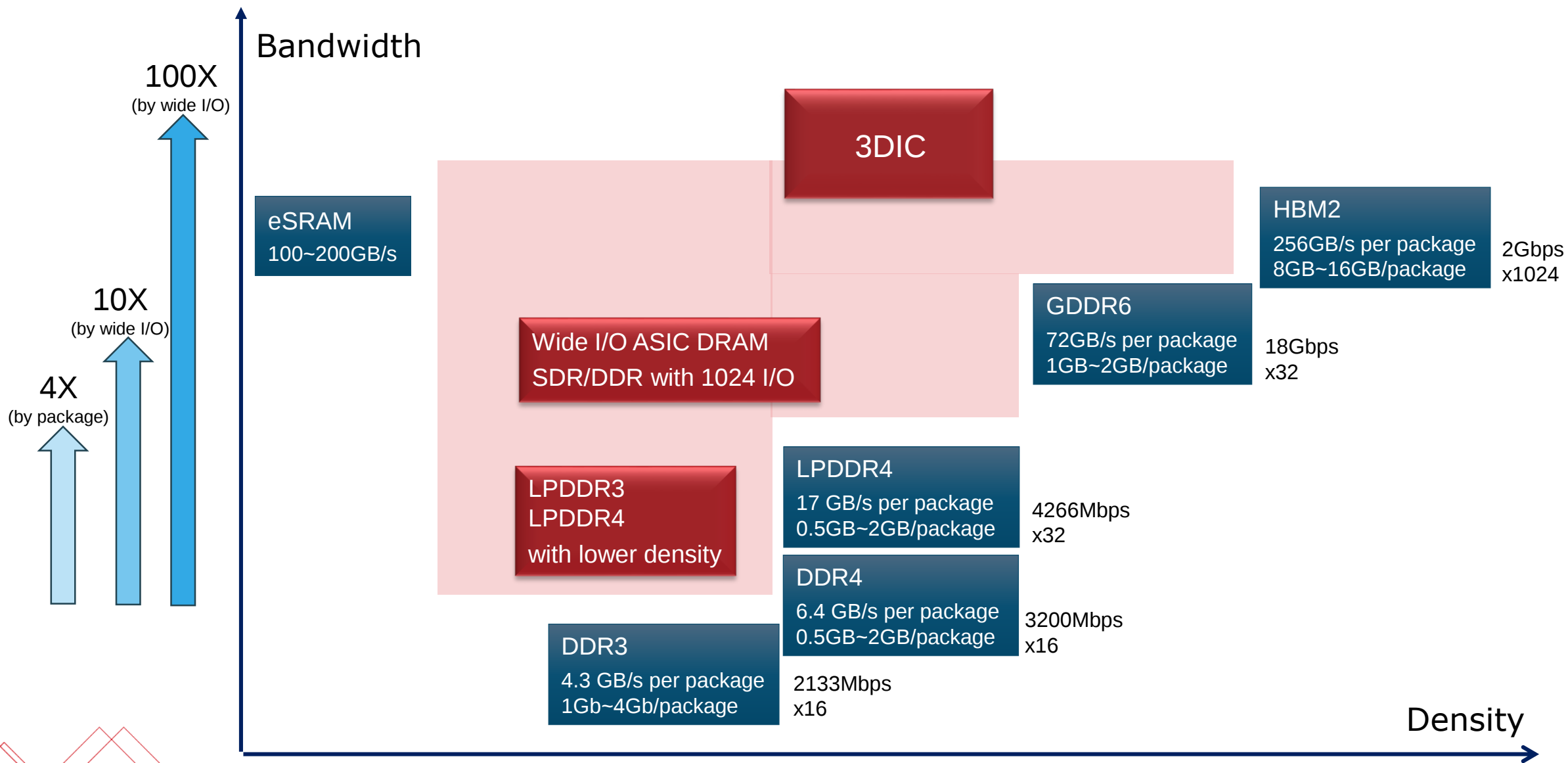


Winbond 3DIC DRAM

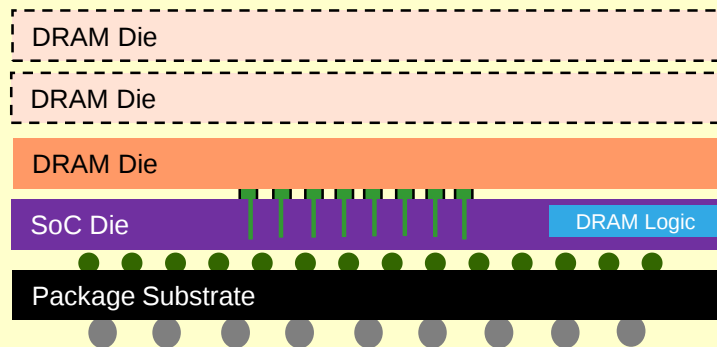
December, 2020

winbond
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A Global Supplier of
Advanced Memory Solutions



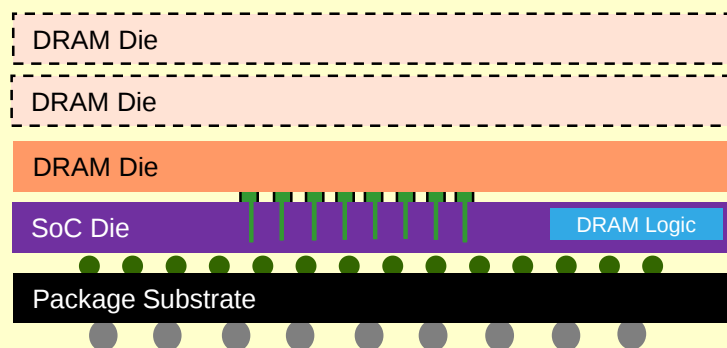
Winbond 3DIC – Proposal



- General spec
 - ✓ 0.5~1GB per die x 1~4 layers
 - ✓ **256GB/s (or more) bandwidth with 4096 I/O**
 - ✓ **Die-to-wafer Hybrid bonding by UMC**
 - or
 - ✓ **1TB/s (or more) bandwidth with 16K I/O**
 - ✓ **Wafer-on-wafer 3DFabric by TSMC**
- Advantages
 - ✓ Cost: No need for interposer and Logic Die
 - ✓ Lower power consumption
 - ✓ Lower latency

3DIC Advantages (1/2)

Winbond New Memory – 3DIC



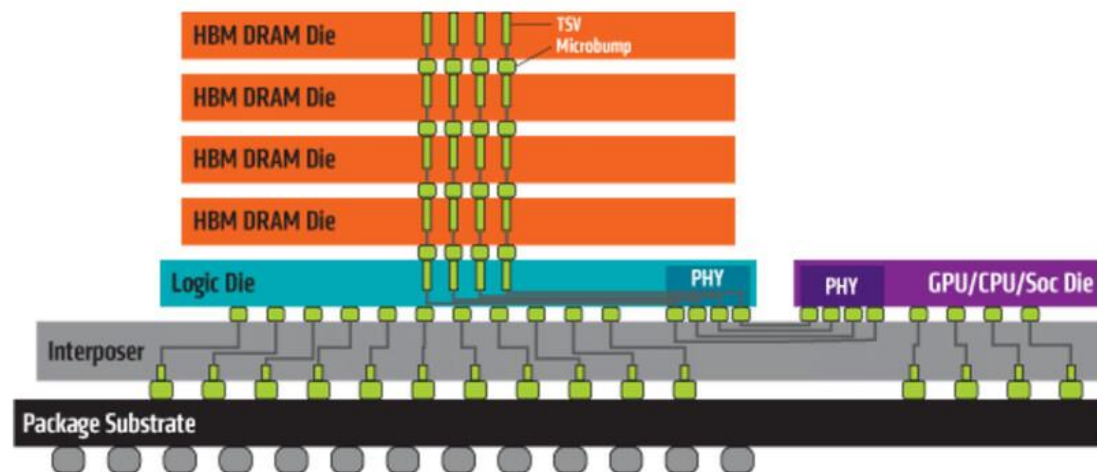
➤ Advantages

- ✓ Cost: No need for interposer and Logic Die
- ✓ Lower power consumption
- ✓ Lower latency

➤ Critical point

- ✓ TSV in SoC die
- ✓ To move DRAM logic to SoC die

HBM



➤ Spec (HBM2)

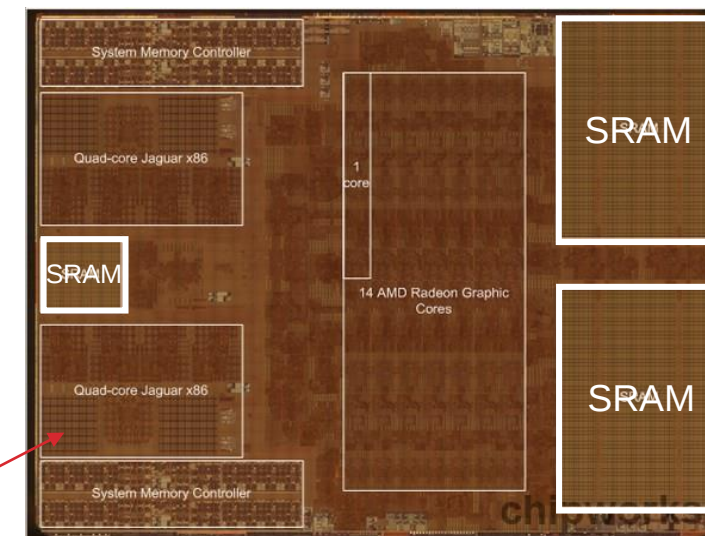
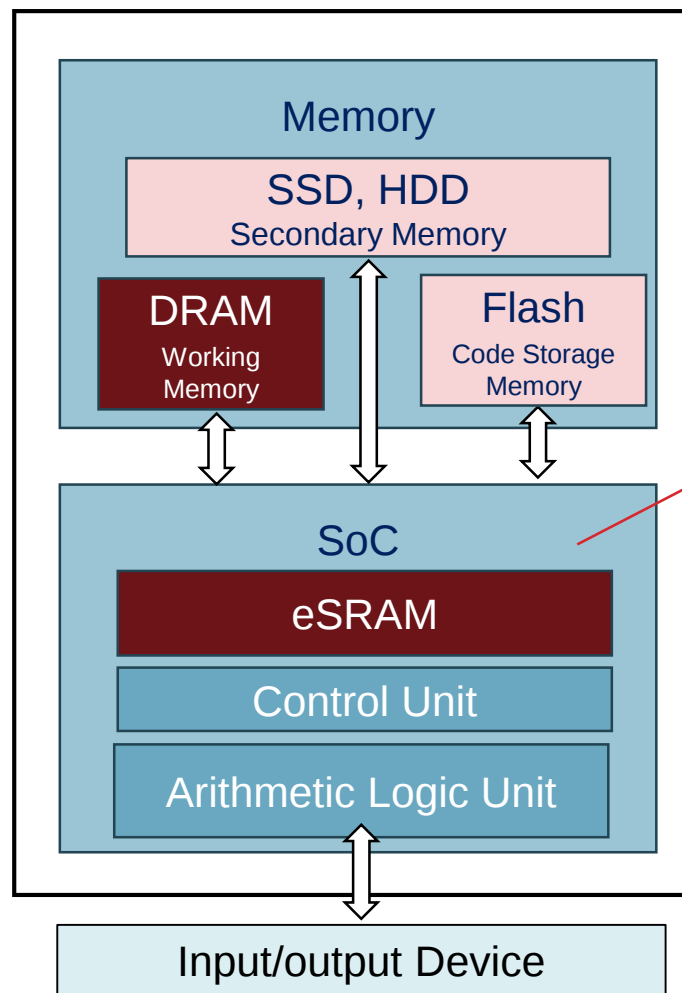
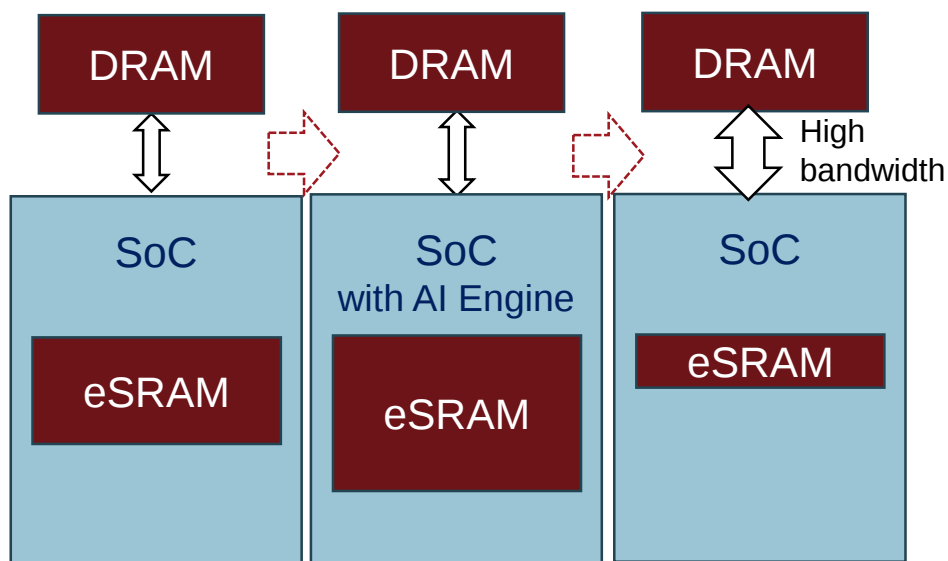
- ✓ 1/2GB per die x 4/8 layers
- ✓ 256GB/s bandwidth with 1024 I/O

➤ Cost and price (HBM2)

- ✓ Higher price for 16GB market price
- ✓ Interposer cost

3DIC Advantages (2/2)

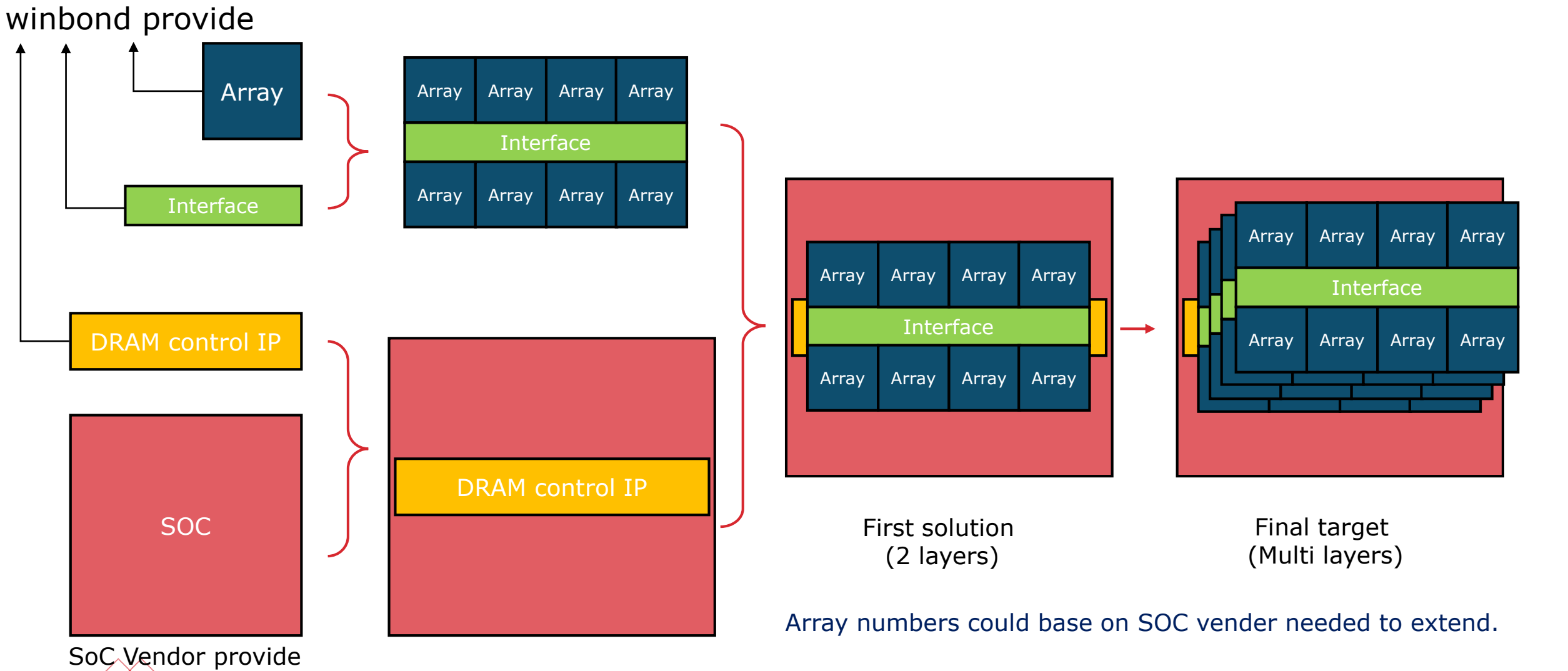
To reduce the cost of embedded SRAM



Microsoft Xbox One vs. Sony PlayStation 4 Memory Subsystem Comparison

	Xbox 360	Xbox One	PlayStation 4
Embedded Memory	10MB eDRAM	32MB eSRAM	-
Embedded Memory Bandwidth	32GB/s	102GB/s	-
System Memory	512MB 1400MHz GDDR3	8GB 2133MHz DDR3	8GB 5500MHz GDDR5
System Memory Bus	128-bits	256-bits	256-bits
System Memory Bandwidth	22.4 GB/s	68.3 GB/s	176.0 GB/s

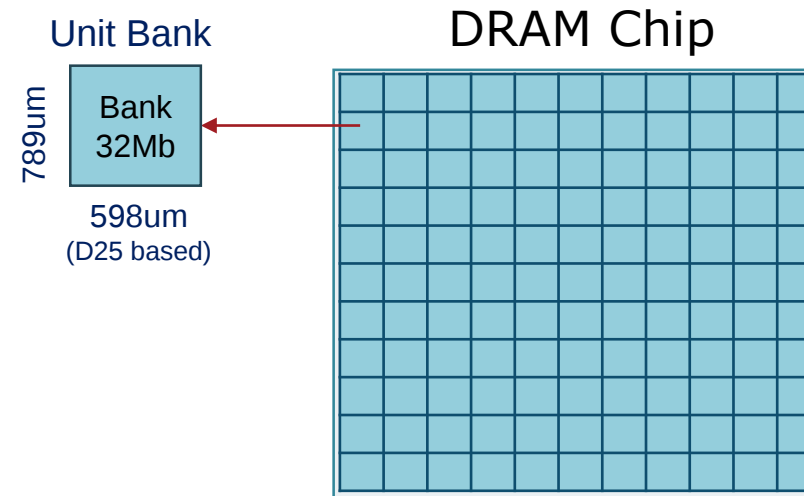
Winbond New Memory Architecture for 3DIC



New Memory Architecture – Unit Bank

□ New Array Architecture - Unit Bank and Test Module

- Small density per Bank x Multi Bank per array
- Purpose and advantages
 - ✓ Enhance the feasibility of density modification
 - ✓ Reduce the learning curve of testing coverage and wafer yield enhancement



Thank You

