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New SSD Controller with eMMC array

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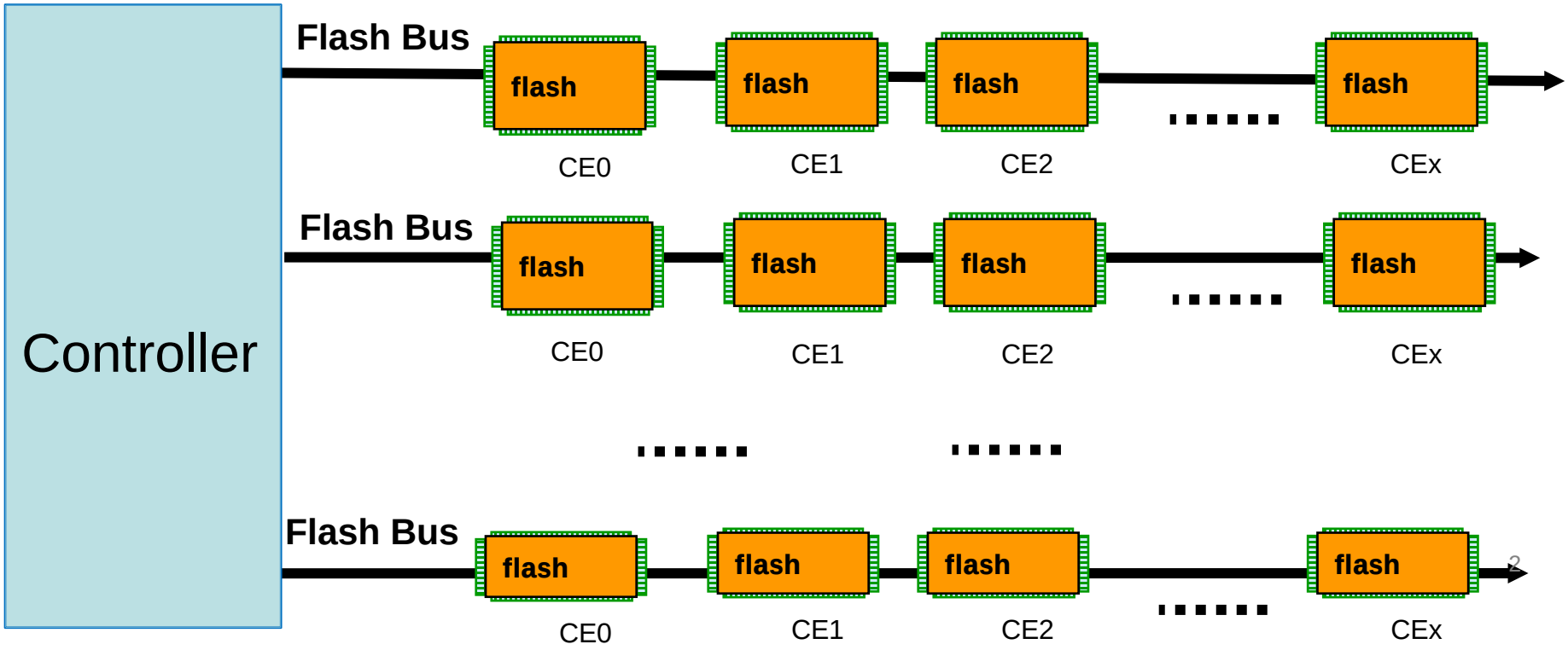
Today's SSD Controller ➔ Driving Flash Array



We Pursue: Higher Density and Higher Speed

However, we are facing problems as following……

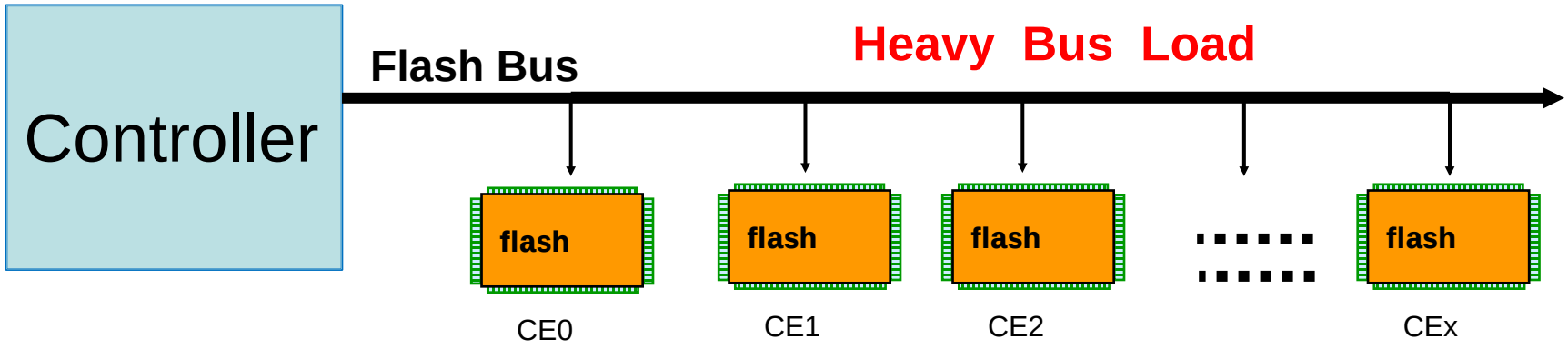
Problem (1)

- Higher Density and Higher Speed ➔

  Driving More Flash chips ➔

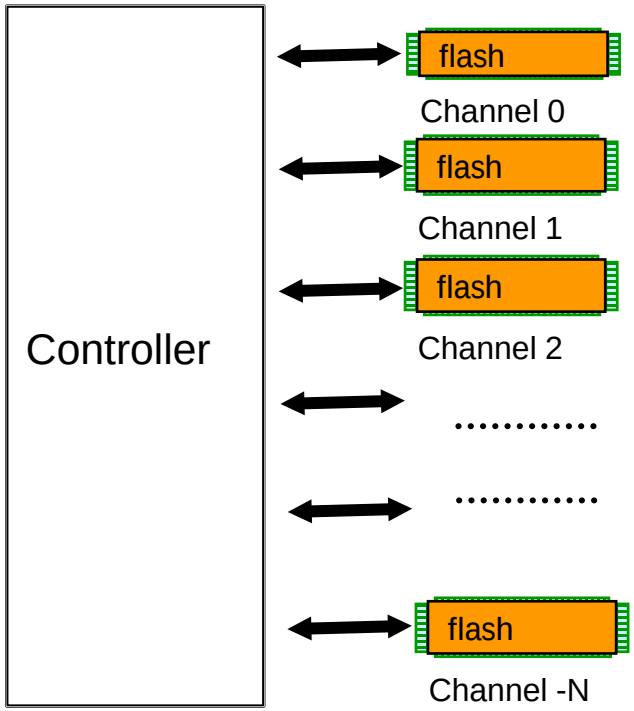
  Heavier Bus Load ➔ Limited Bus Speed

  (Serious for DDR/Toggle interface)



Problem (2)

- Higher Density and Higher Speed
  - ➔ Driving more flash buses in parallel
  - ➔ More PADs/PINs
    - Limited Die Size,
    - Limited Package Size
    - Limited Package Cost
    - Limited PCB Space
- ➔ PAD or Core limited Design?



Flash Bus Pads: Data 8 wires, Control signal 7 wires, at least 2 pads for power and ground. Total: 17 PADs
PAD number for N channels: 17 × N
If N= 8, PAD number is 136
If N=16, PAD number is 272
If N=32, PAD number is 574, …….

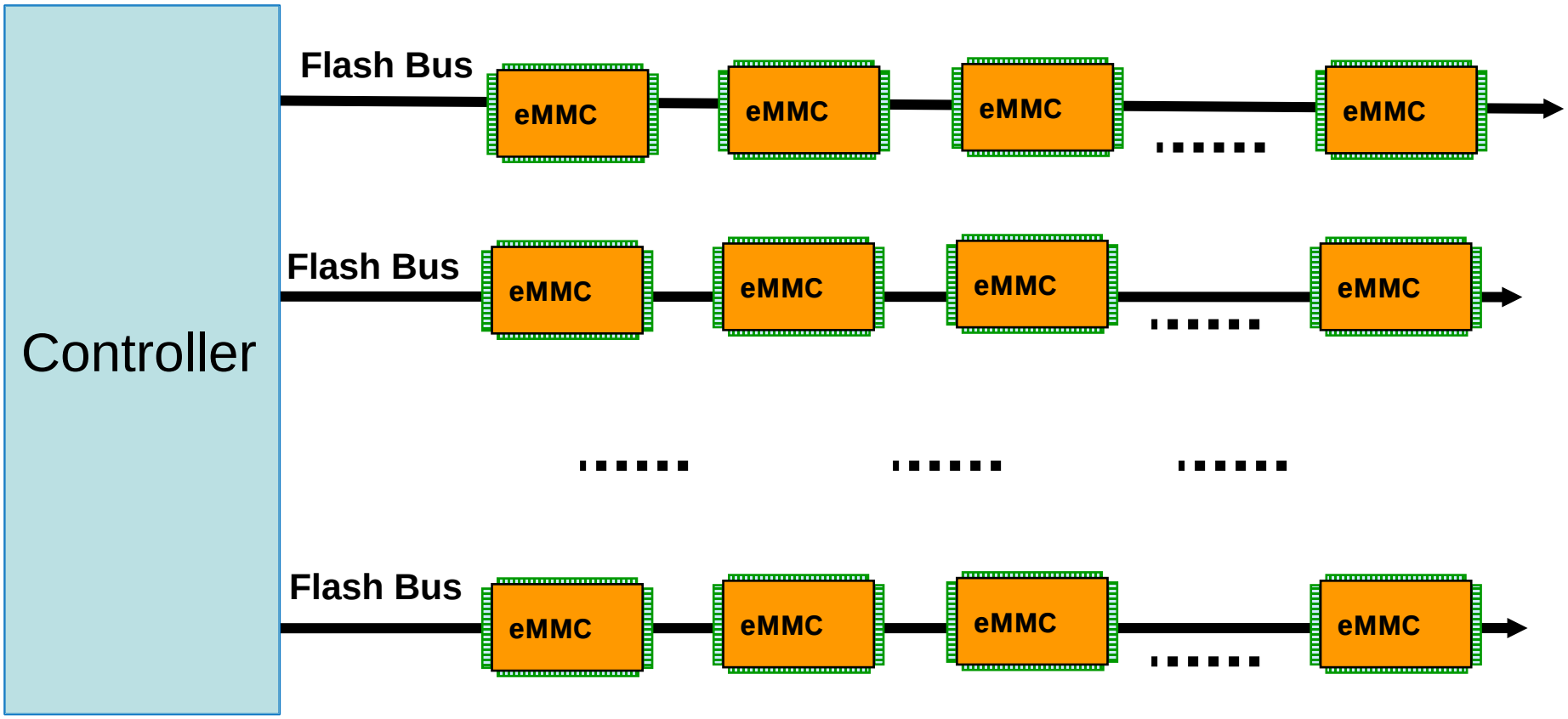
Problem (3)

- Catching fast-changing flash datasheets
  - Flash is continuously and frequently updated from 65nm …45nm…35nm…25nm…19nm…15nm…
  - All keep changing: endurance, ECC, wear-leveling,……
  - Controller vendor's head-ache:
    - Expensive tape-out cost…
    - Long tape-out period …
    - Exhausting workload…

Solution

SSD controller + eMMC Array

SageMicro's SSD Controller ➔ Driving eMMC Array



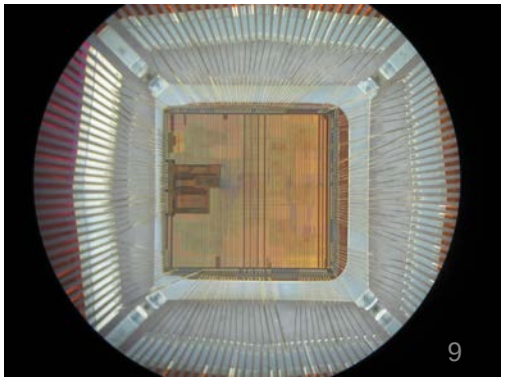
Advantages

Compare items	SSD with Flash Array	SSD with eMMC Array	Advantage
Single package's Max. Density	32GB	128GB	Higher Density
Single package's PIN count	17	12	Less Pin Count
Flash Management Algorithm?	Mandatory	Optional	Less Flash management
New controller for new flash?	Possible	No	Controller not changed
New firmware For new flash?	Possible	No	Firmware not changed

Build 1T SSD?
Just **put 8 eMMC modules** on board, each eMMC with 128GB density..

SageMicro's SSD Controller Family

Part#	Interface	Flash or eMMC	Channel Number	Mass Product Date	Package
S681	SATA-II	**Flash**	1,2,4,5,8,10	Oct. 2012	BGA207
S685	SATA-II	**Flash**	1,2,4,5	Dec. 2013	QFN88
S881	PCIE Gen-II	**Flash**	1,2,4,5	Nov. 2014	BGA256
S661	SATA-II	**SD/eMMC**	1,2,4,5,8,10	Oct. 2012	BGA207
S663	SATA-II	**SD/eMMC**	1,2,4,5	Dec. 2013	QFN88
S861	PCIE Gen-II	**SD/eMMC**	1,2,4,5	Nov. 2014	BGA256



Questions?

- Cost Effective?
  - eMMC = eMMC controller + Flash.
  - eMMC price > flash ?
  - Maybe, but not always…

- Low quality ?
  - eMMC original for consumer application.
  - But, JEDEC is making it for high-end application:
    - Speed ➔ DDR,
    - New Commands ➔ SSD like
    - ……

What's the Future

- Future Expectation:

  JEDEC provide more eMMC features for SSD application like TRIM.

- eMMC is no longer "low quality" consumer concept.
- eMMC will be fine-tuned to embedded module for storage system.

Make your SSD modularization by eMMC.

Believe me, I am serious ➔ I am not joking ...

Cook Your own SSD by TF Cards.

GCAI
SSD
1TB
2.5"SATA III
Solid State Drive

Thank You !

Any questions?
Please feel to contact me by

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