Embedded and Removable Memory Solutions

Presented by Victor Tsai
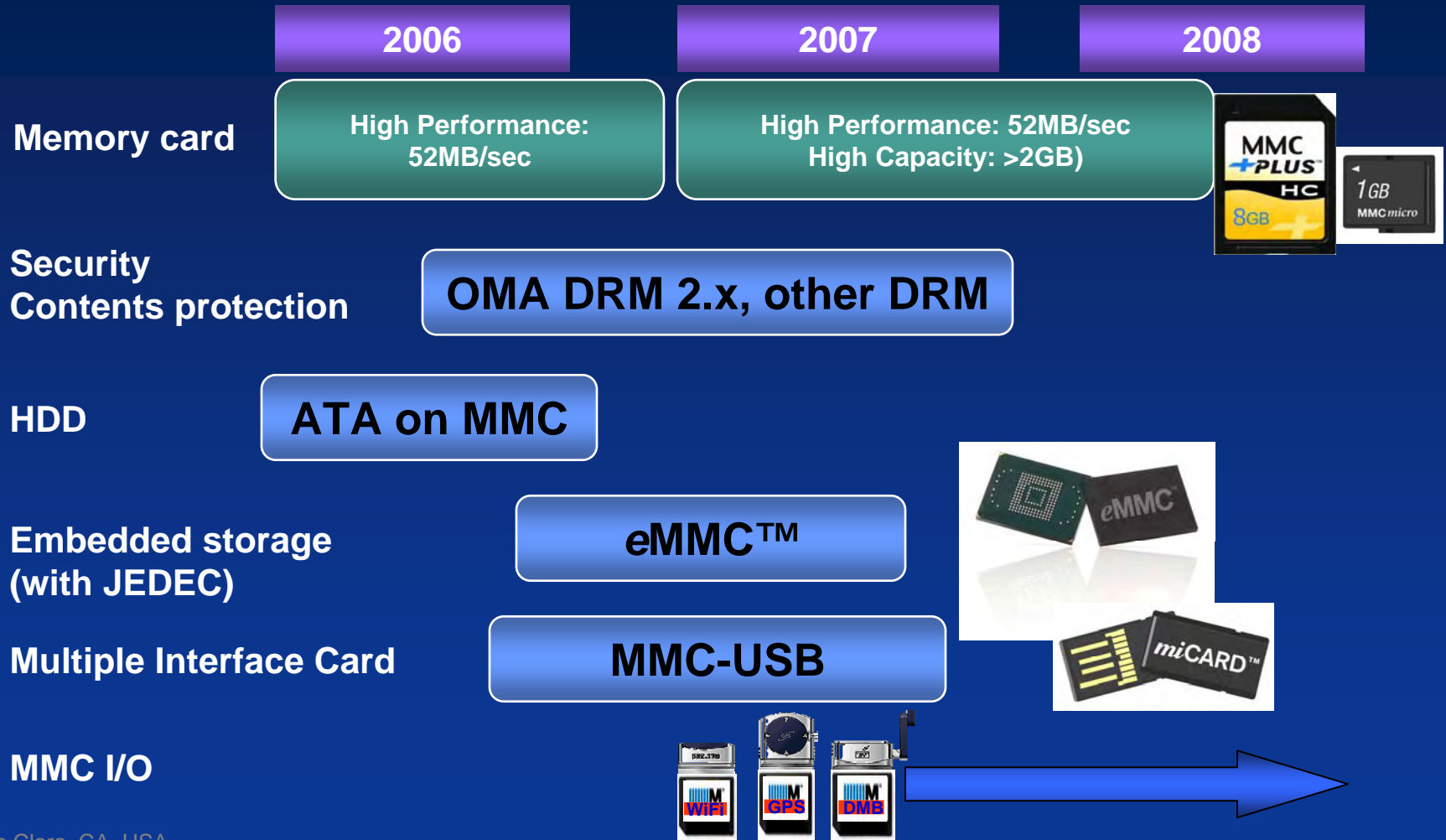**Micron Technology, Inc.**

MultiMediaCard Association (MMCA)
Marketing Committee Chairman
vtsai@micron.com

MMC Association (MMCA)

- Membership representing leading manufacturers of:
  - Handsets   - semiconductors (flash & controllers)
  - Cameras   - Flash cards   - HDDs
  - Connectors (sockets)   - Smartcards

- Open Standard. MMCA doesn't collect royalties

- 2007 Board Members:

MMCA Standardization Activities

2006	2007	2008

Memory card

High Performance: 52MB/sec	High Performance: 52MB/sec High Capacity: >2GB)

**Security
Contents protection**

OMA DRM 2.x, other DRM

HDD

ATA on MMC

**Embedded storage
(with JEDEC)**

eMMC™

Multiple Interface Card

MMC-USB

MMC I/O

Drivers for Mobile Memory Products

MOBILE OFFICE

MUSIC

VIDEO

STILL IMAGES

GAME

NAVIGATION

Mobile Device Memory Types

Volatile

Memory

Non−Volatile

Random Access Memory (RAM)

Flash

Static RAM

Mobile Synchronous Dynamic RAM

NAND

NOR

LP SRAM

Pseudo SRAM

Discrete NAND

eMMC (Embedded NAND + controller)

Memory Card

**MMCplus
MMCmobile
MMCmicro
miCARD**
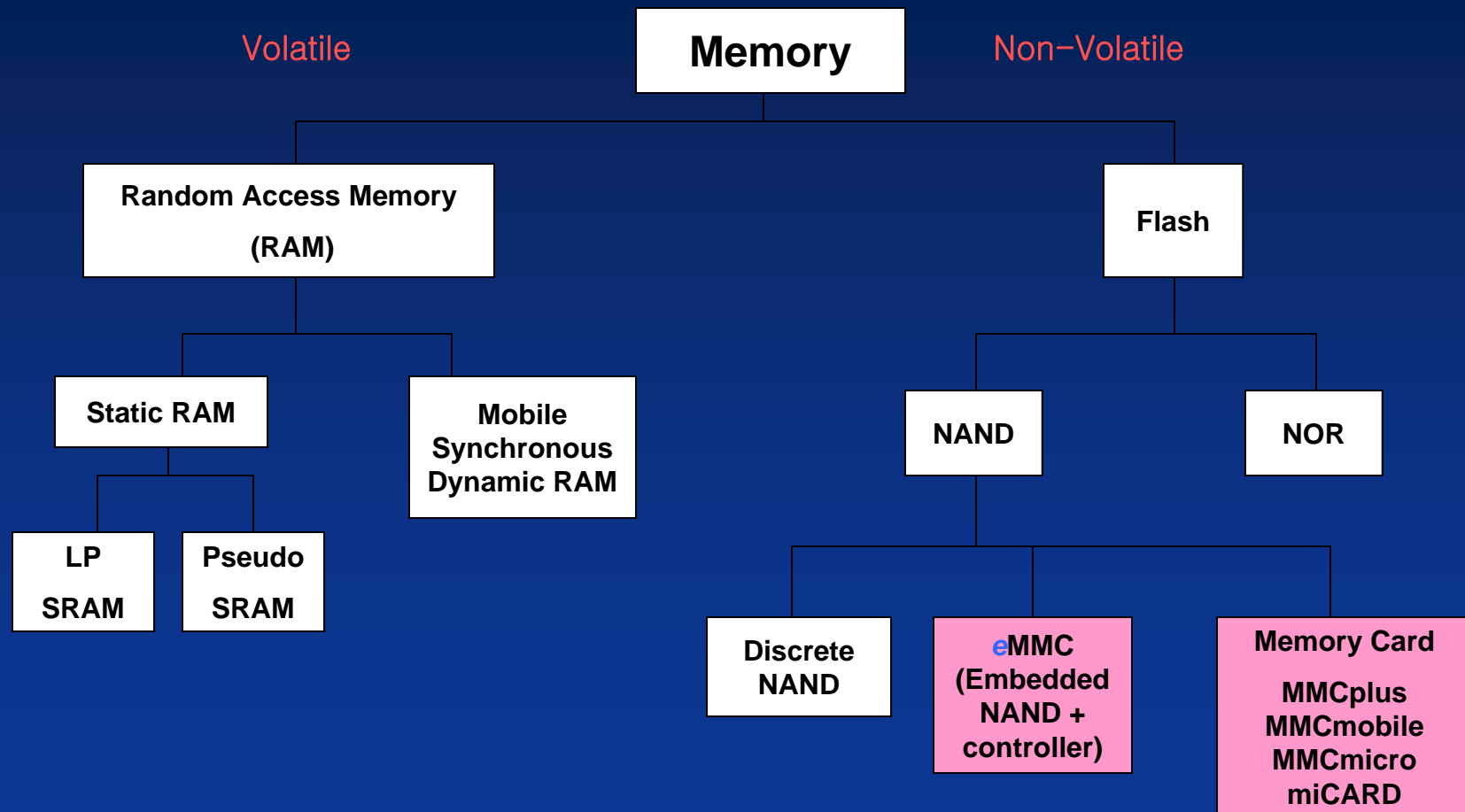
Storage Comparisons

	capacity GB	bandwidth MB/s	Reliability Endurance	Compa-tibility	Remo-vability	chipset support	Space mm³	price €/MB
NOR Flash		Read: 300 Write: 0.5		no standard				
Discrete NAND			bad blocks	no standard				
eMMC								
Memory Cards							Socket + card	
small HDD			shock					
High speed SIM						interface		

MMC*plus*™, MMC*mobile*™ & MMC*micro*™ Card Features

HC MMC*plus*™
Standard MMC format
(32x24x1.4mm)

- High clock frequency: **26MHz and 52MHz**
- Flexible bus width: 13 pins to **support 1 to 8 data lines** (host-selectable x1, x4 and x8-bit bus)
- Data transfer rate: **up to 52 MBytes/sec** (3-4 times the data transfer rate of competing memory card standards)
- **Highest bus transfer rate** of all flash memory card standards available today
- **Backward compatible** to legacy hosts

HC MMC*mobile*™ MMC*micro*™
Reduced-Size   *Micro-Size*
(18x24x1.4mm)   *(12x14x1.1mm)*

- Fully compatible with MMC*plus*™
- **MMC*mobile*** is the first small-form-factor memory card standards to offer **dual-voltage operation -- 3V and 1.8V**
- **MMC*micro*** supports **3V operation** (1.8V optional)
- Compatible with next-generation mobile-phone system specifications; meets the toughest **space saving** and **low power consumption** requirements of mobile phones and small consumer electronics devices
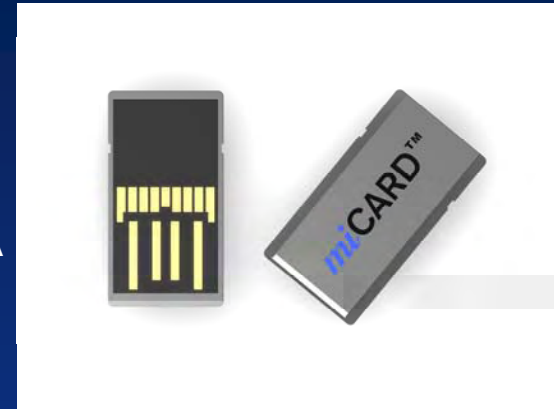
Introducing miCARD™
The Best of MMC and USB

- Full Std-A USB compatibility
  - No ASIC or S/W changes for PCs and other USB hosts
  - Thickness and width driven by USB Std-A slot
- Full MMC electrical compatibility
  - No ASIC or F/W changes for embedded systems
- Compelling removable form factor for DSC and phones
  - Ideal size: 12mm x 21mm x 1.95mm
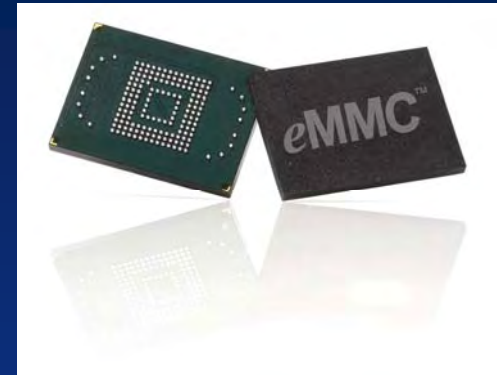- Using a mechanical adapter, miCARD is backward compatible with many existing CE products that support MMC

Embedded MMC Concept

Card Form Factor

NAND Flash   +   MMC controller

FBGA Form Factor

Slot

Built-in

- Memory Cards -
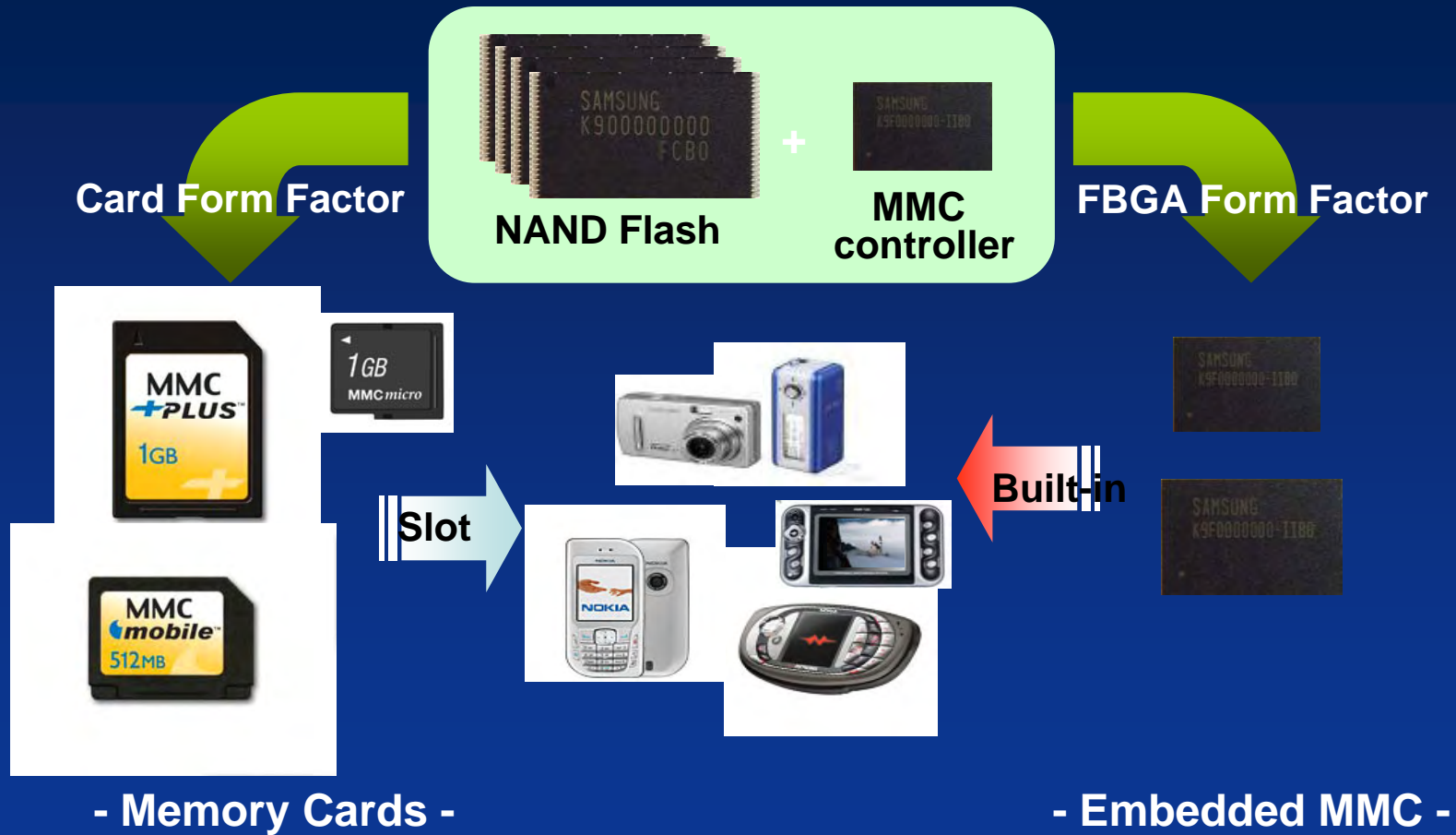
- Embedded MMC -

eMMC™ (Embedded MMC)

- eMMC is high-speed MMC in BGA package
  - Based on MMCA and JEDEC joint standards
  - Interface speeds of up to 52 MB per second
  - Supports x1, x4 or x8 bus width
  - Operating voltage: 1.8v or 3.3v
  - JEDEC proposed package options include:
    - 11.5 x 13 x 1.2mm
    - 12 x 16 x 1.3mm
    - 12 x 18 x 1.3mm
- eMMC simplifies mass storage designs for portable consumer electronics products
  - A host system can now use a single memory bus architecture for both embedded and removable non-volatile mass storage
- Companies supply eMMC under different brand names, all built to eMMC standard
  - For example: Samsung MoviNAND, Micron ManagedNAND

Thank You

www.mmca.org