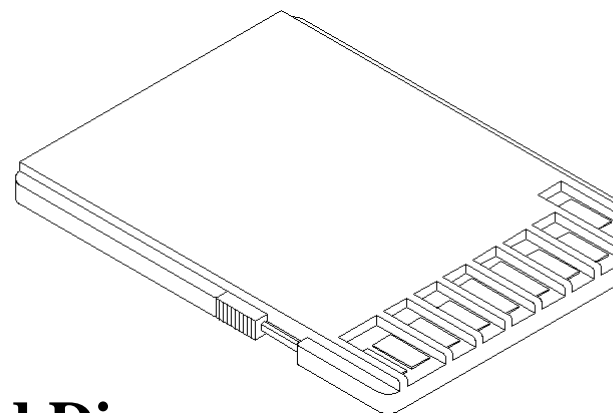


SD Memory Card Over View



**Media Card Div.
Digital Media Network Co.,
Toshiba Corporation**

1) History of Media Card

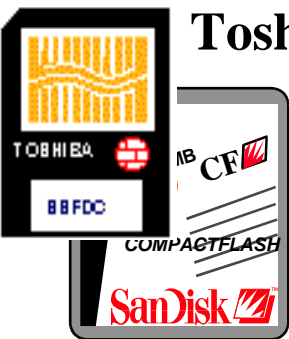
Secured Card

Toshiba, Matsushita, SanDisk

SONY

Toshiba, Samsung

Hitachi
Sanyo,
Infineon



Toshiba, Samsung

SanDisk,
Hitachi

Non Secured Card



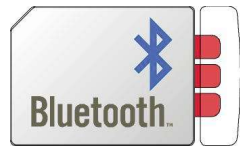
SanDisk, Hitachi
Siemens (Infineon)

SONY



?

I/O Card

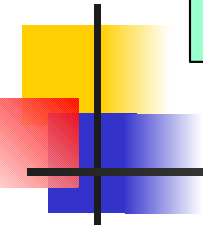


Bluetooth



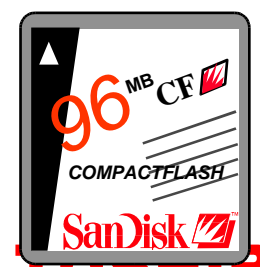
GPS
Camera

2) COMPARISON



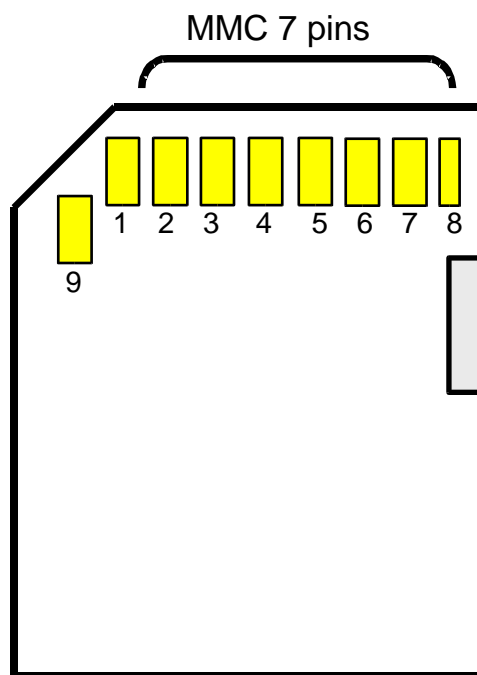
	Smart Media	SD Memory Card	Memory Stick	MultiMedia Card	Compact Flash
Capacity (MB)	4 - 64	8/16/32/64	4 - 64	4 - 64	4 - 192
Data Xfer (Max.MB/s)	2.0/10	2.0/10		.5	.0
SDMI Security	Cat. II ²	Cat. III	Cat. III ¹	Cat. II	Cat. I
Form (WxDxH, mm)	37 x 45 x 0.76	24 x 32 x 2.1	21.5 x 50 x 2.8	24 x 32 x 1.4	42.8 x 36.4 x 3.3
Volume (mm ³)	1,298	1,612	3,010	1,075	5,141
Weight (g)	1.8	2.0	.0	1.5	11.4
Write Protect	Physical ³	Physical	Physical	Electrical	None
I/O Pin					
Controller	No	Yes	Yes	Yes	Yes
Chip					
Developer	TOSHIBA	TOSHIBA, SanDisk, Matsushita,	SONY	Siemens SanDisk	Sandisk Hitachi

:1 Magic Gate type
 :2 Shipped in and after 1999
 :3 Write Protect Seal



3) High Speed Data Transfer

- **Data transfer : Max. 2.0MB/s (in future 10MB/s)**
- **MMC 7 pin interface preserved and 3 additional data lines**
- **Controller module built-in**



Pin 1	Data 3
Pin 2	Command
Pin 3	Vss
Pin 4	Vdd
Pin 5	Clock
Pin 6	Vss
Pin 7	Data 0
Pin 8	Data 1
Pin 9	Data 2

4) The Merit of SD Memory Card

Upper Compatibility against MultiMedia Card

High Transmission Speed 2MB/s

(Max. 10MB/s using 4 data pins)

Small size

Write Protect SW for MultiMedia data

Format Including Security (CPRM)

Category 3 for SDMI PM (Portable Media)

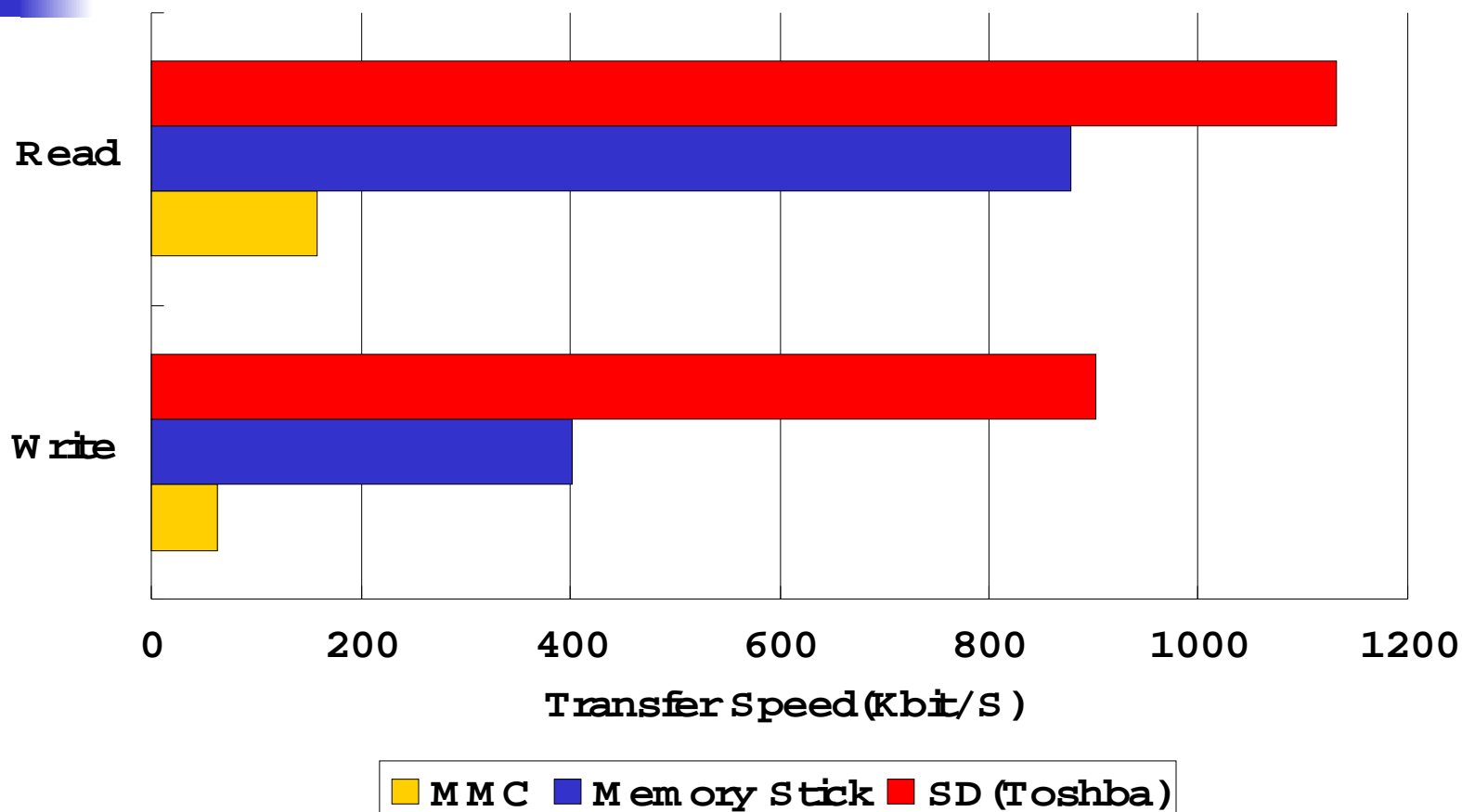
Content Scramble+Authentication

CPRM was adapted by DVD, HDD security

4. Open Standard by SD Association.

5. Many Powerful Members.

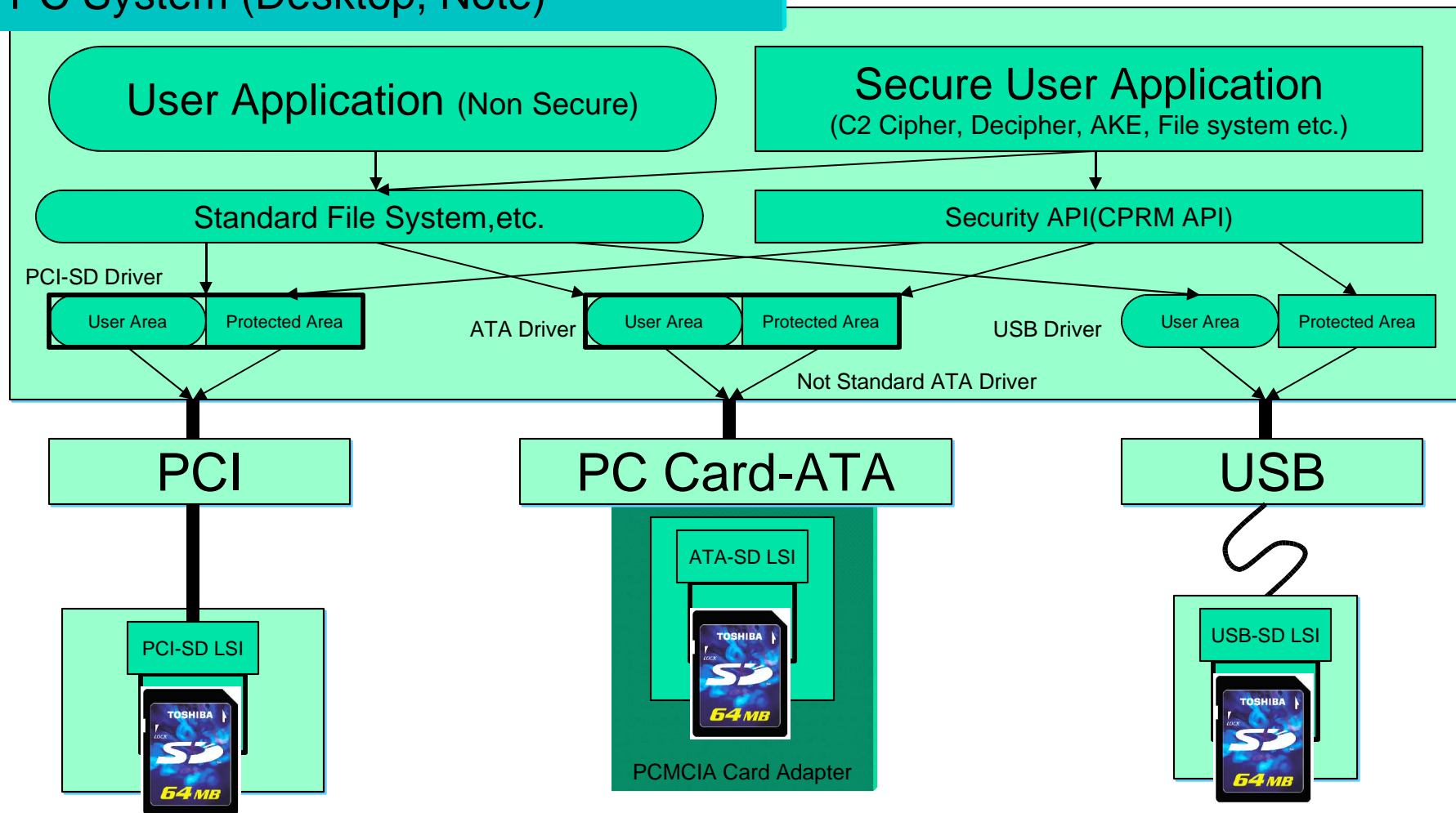
5) Transfer Speed



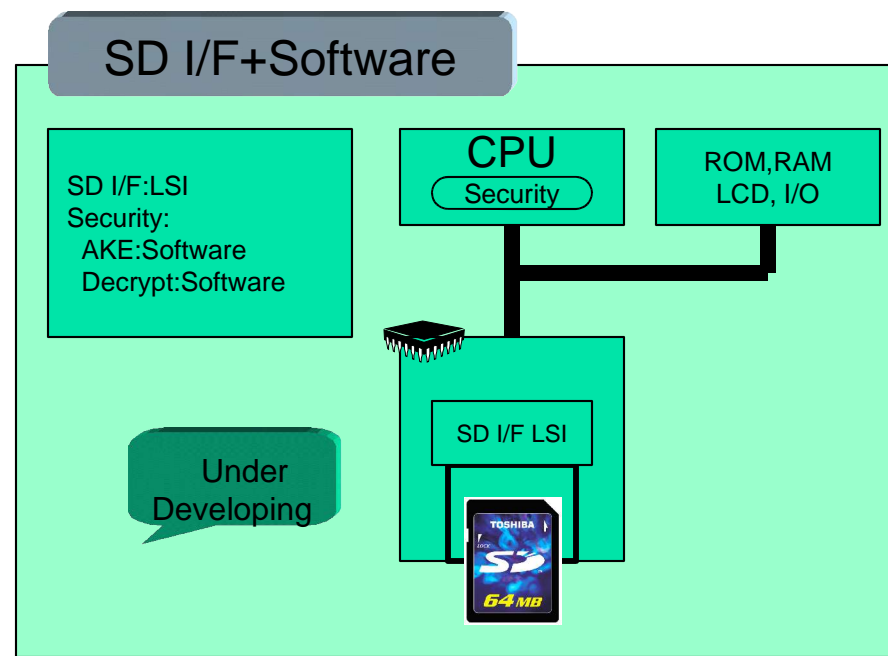
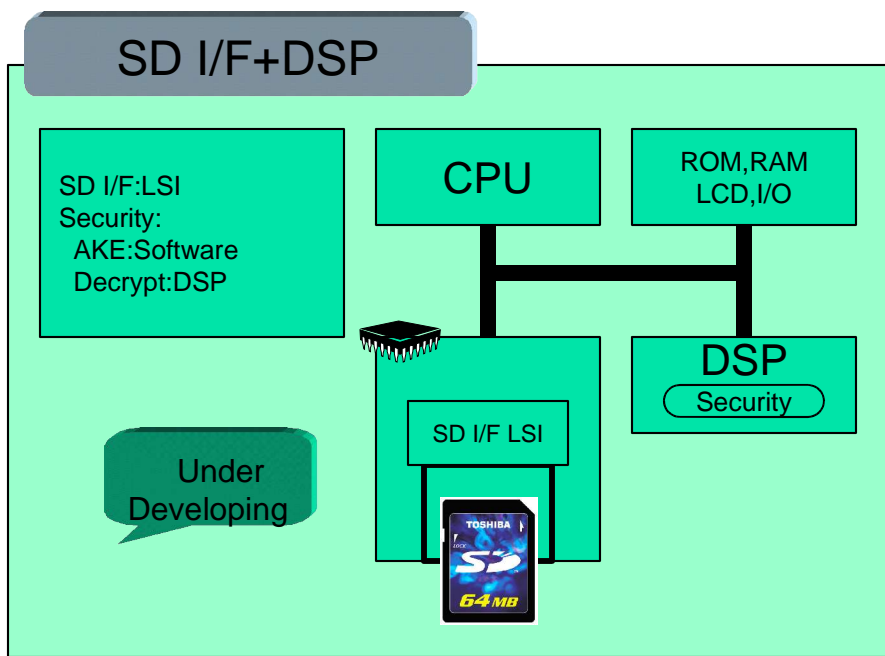
Testing: HDBENCH (1MB/4MB/10MB/20MB transfer)
target: MMC, Memory Stick, SD card and each PC adapters

6) SD Card Control Architecture for PC

PC System (Desktop, Note)



Embedded System Part1



7) File System

SD Memory Card File System Defines the Logical Structure File System Based on ISO/IEC9292 Standard.

Supports Two Areas

Data Area - Access Without Mutual Authentication

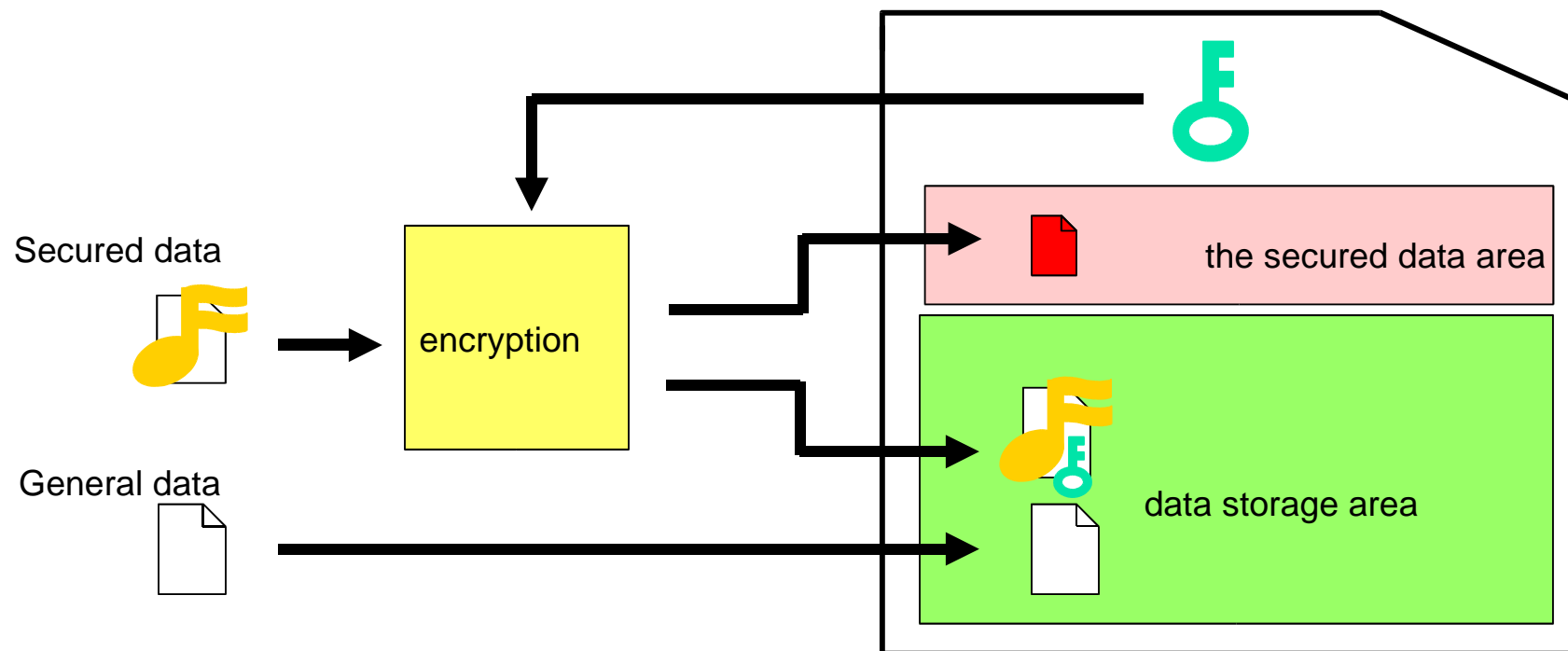
Protected Area - Access With Mutual Authentication

FAT File System Supports FAT12 and FAT16

8) Memory Area In Card

Secured media content(music, etc.,) is encrypted by the secret key and stored into the data storage area.

Access only after mutual authentication





9) TOSHIBA Media Card Roadmap

(Ex)Recording time compressed by AAC stereo:
128kbps (CD quality) and 96kbps (MD quality)

2MB	2 min	3min
4MB	4 min	6min
8MB	8 min	11min
16MB	17min	22min
32MB	34min	44min
64MB	64min	90min



1997
2/4/8MB

1998
16MB

1999
32/64MB

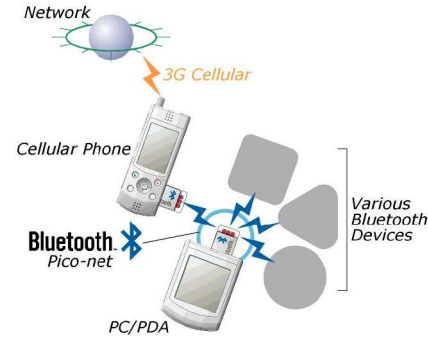
2000
128MB

2001
256/512MB

TOSHIBA is a global supplier of NAND Flash memory,

Yokkaichi and Dominion are its main works **TOSHIBA**

10) SD I/O Card



Bluetooth



FM/TV Tuner



Voice Recorder



Cellular Phone



Audio Player



Pedometer



Health Care



Games



GPS



Digital Camera



11. SD Memory Card Applications

