



IWAYAG

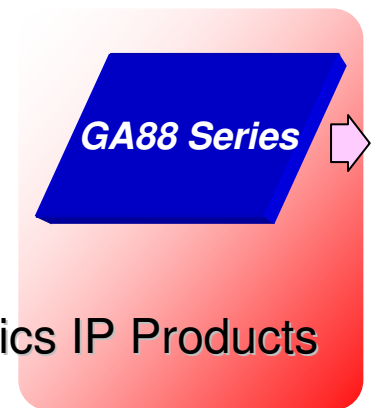
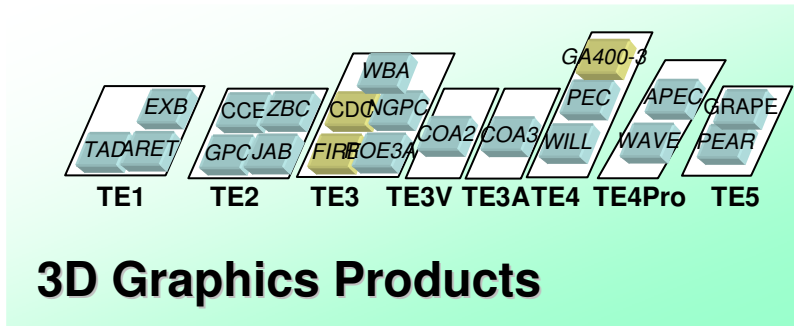
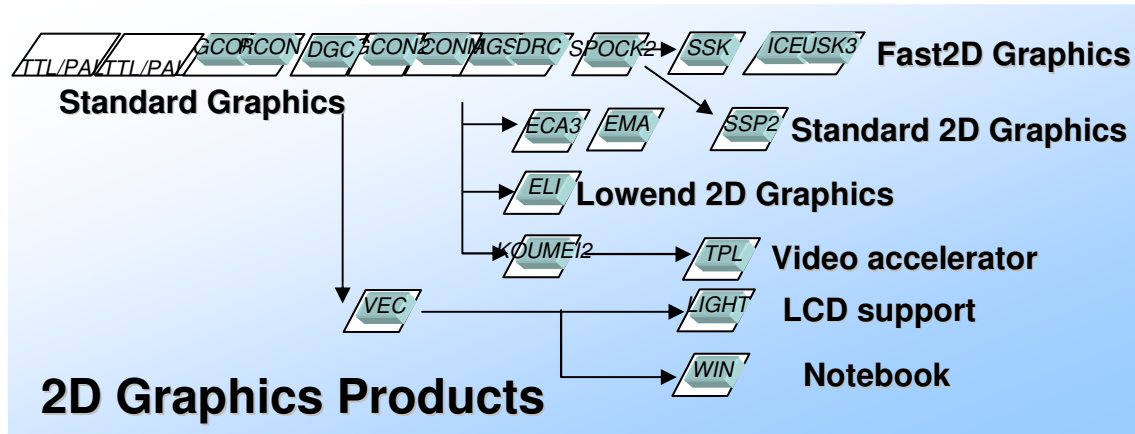
Introduction of IWAYAG, a graphics accelerator based on OpenVG 1.1

December 10, 2008

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NEC System Technologies, Ltd.**

History of Graphics products at NEC System Technologies

1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006



Graphics IP Products

: LSI

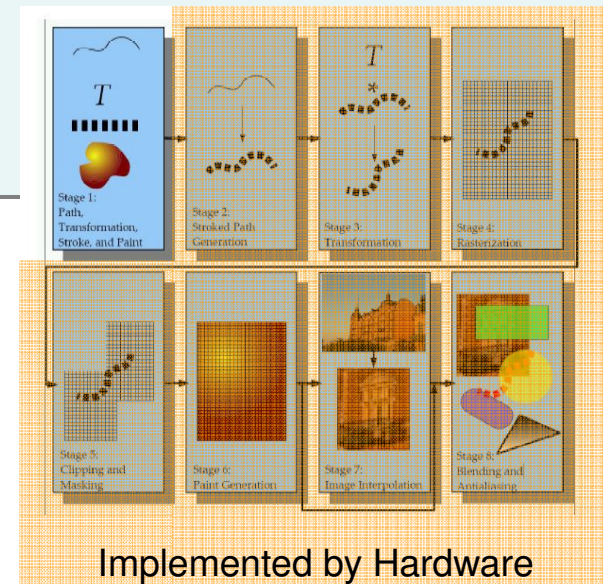
: Board products

What is IWAYAG?

- IWAYAG is a graphics accelerator dedicated for vector graphics, consisting of**
- Hardware IP core to be incorporated to the customer's SoC**
- OpenVG driver**

IWAYAG design and features

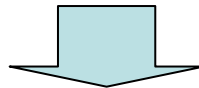
- Native OpenVG accelerator**
 - Architecture of IWAYAG is based on the OpenVG pipeline stage design**
 - Path generation to Blending/Antialias stages are implemented by hardware**
 - No CPU tessellation. Fill is done by hardware using outline buffer**
- Hardware bezier rasterizer**
- Extensive cache control mechanism for fast filling**
- Support fast FSAA**



Why IWAYAG ?

Requirements from the consumer devices market

- Flash support
 - Many consumer device manufacturers plan to incorporate richer UI
 - Flash support is a **MUST** to efficiently develop the rich UI
- Smooth playback of Flash contents while using low-end CPUs
 - Cost and/or battery power limits CPU selection
 - 100Mhz CPU without FPU is common for Digital cameras.
- Long battery life
 - Flash acceleration by 3D engine consumes too much battery powers



Native OpenVG graphics accelerators best meet the requirements

- Good Flash performance while using low-end CPUs
- Much lower power and die size than 3D engine

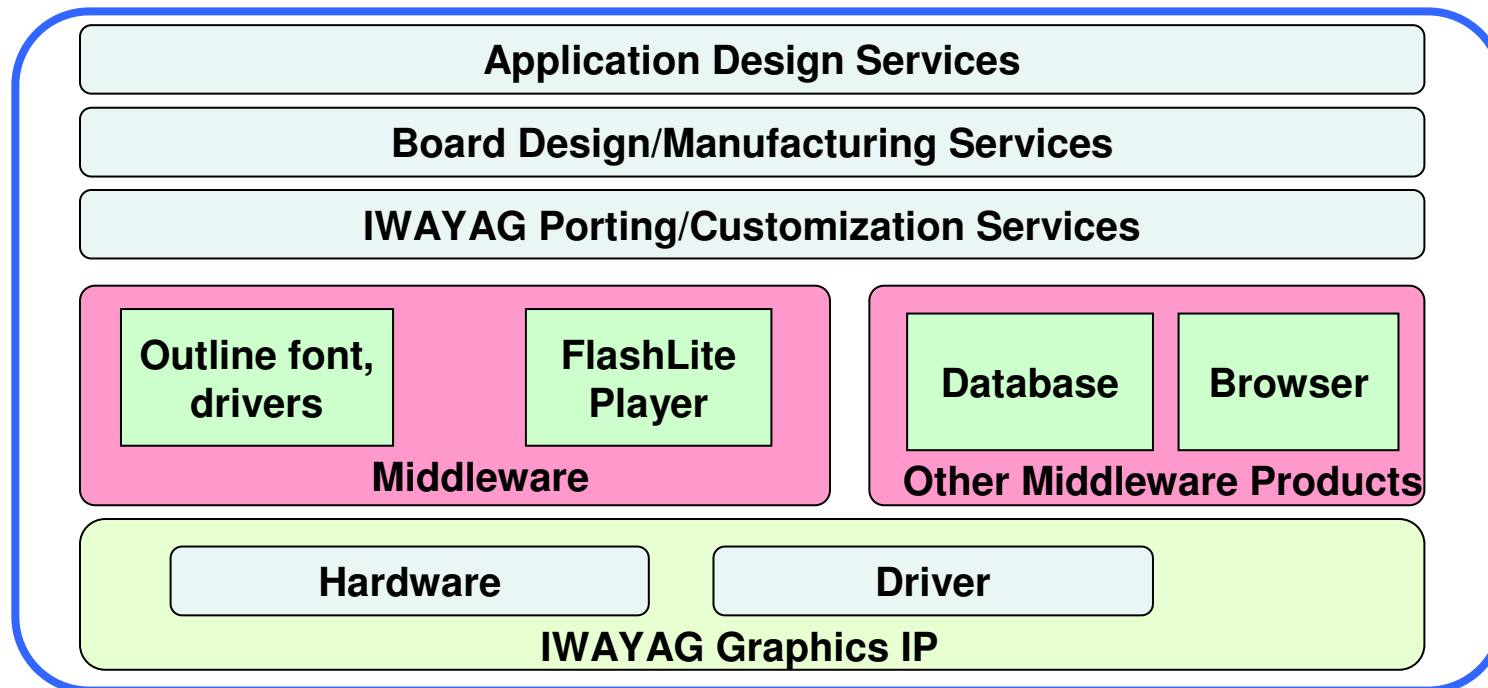
Total Solution of IWAYAG

Supporting software

- OpenVG1.1 Driver
- FlashLite 3.1.5
- Vector font and drivers

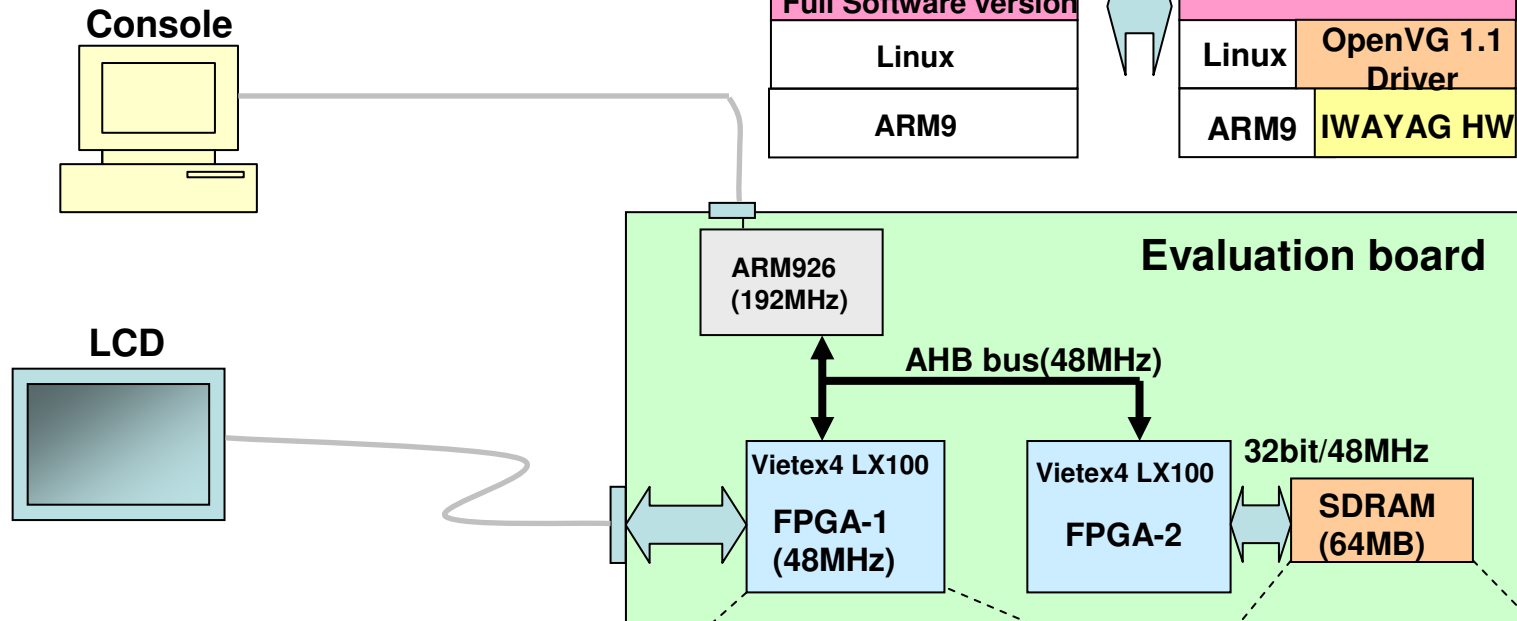
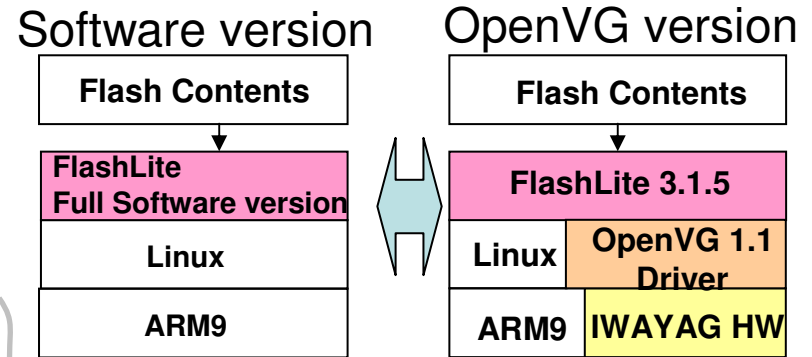
Supporting menu

- Porting to customer's LSI
- Customization of IWAYAG hardware
- Application Design
- Board Design/Manufacturing

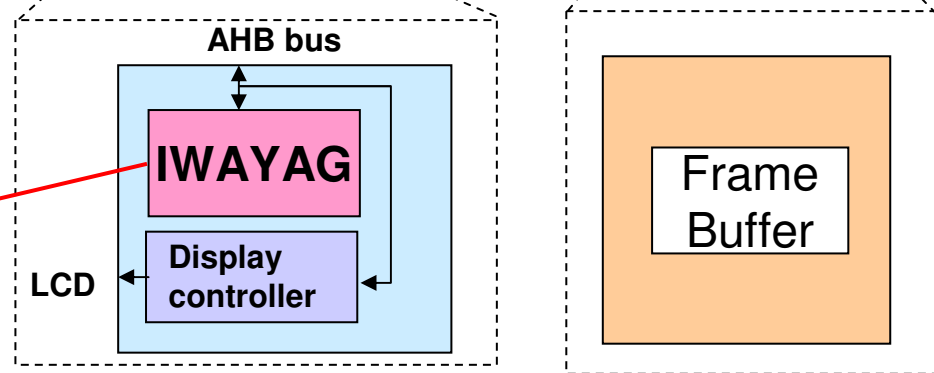


Evaluation Environment of the IWAYAG performance

- ARM9@192MHz
- IWAYAG in FPGA@48MHz clock



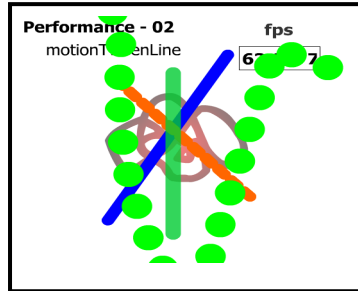
IWAYAG has been designed to run at 200MHz clock. In this evaluation, due to the design of the evaluation board, the testing has been conducted with IWAYAG operating at 48MHz clock.



Performance Improvements on Flash Contents by IWAYAG (1)

FlashPlayer IWAYAG Driver IWAYAG Hardware

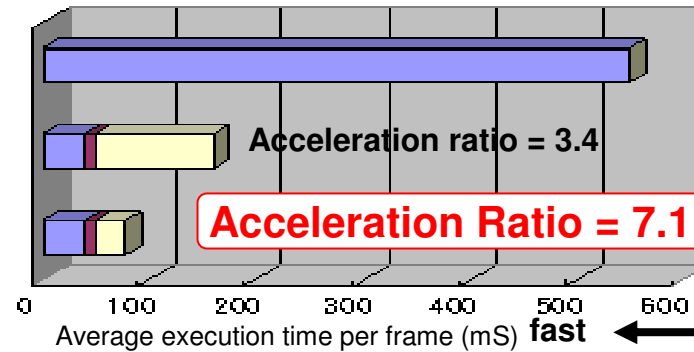
(1)002_motionTweenLine.swf



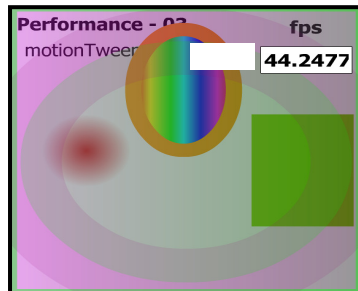
Software

IWAYAG, 48MHz

IWAYAG, 200MHz
(Estimated)



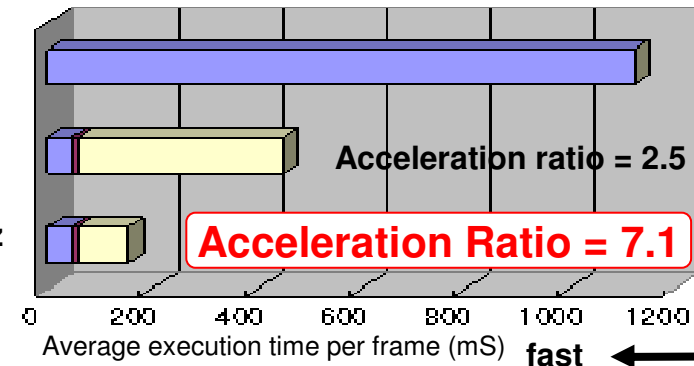
(2)003_motionTweenGradient.swf



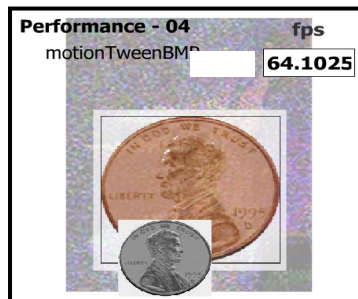
Software

IWAYAG, 48MHz

IWAYAG, 200MHz
(Estimated)



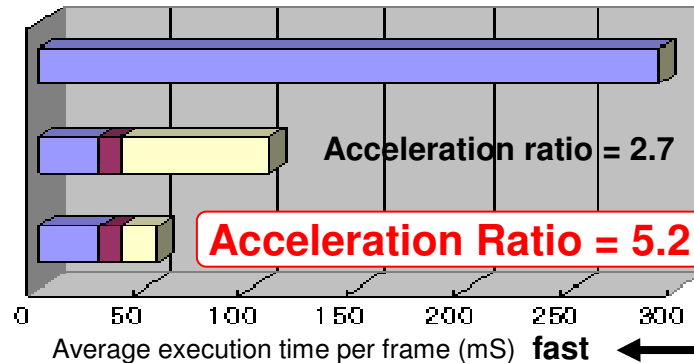
(3)004_motionTweenBMP.swf



Software

IWAYAG, 48MHz

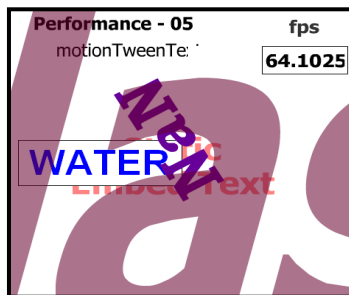
IWAYAG, 200MHz
(Estimated)



Performance Improvements on Flash Contents by IWAYAG (2)

FlashPlayer IWAYAG Driver IWAYAG Hardware

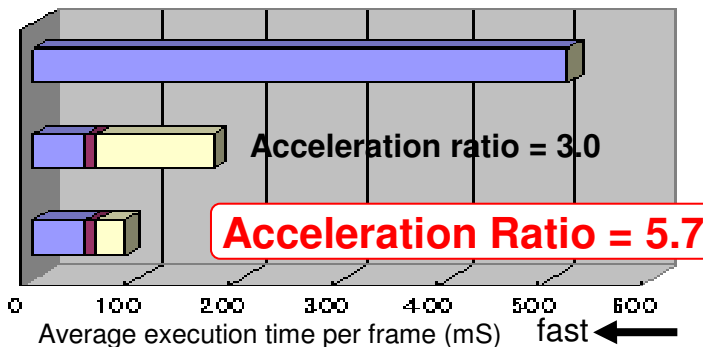
(4)005_motionTweenText.swf



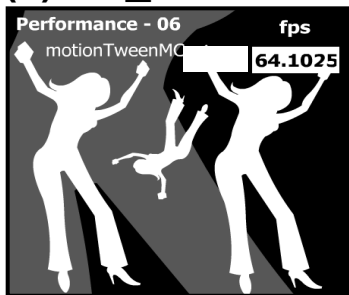
Software

IWAYAG, 48MHz

IWAYAG, 200MHz
(Estimated)



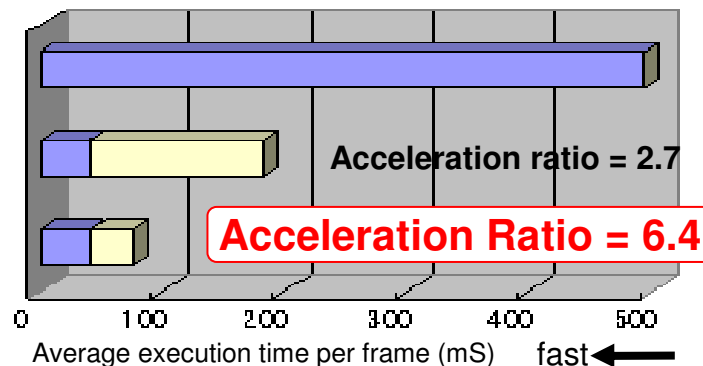
(5)006_motionTweenMC.swf



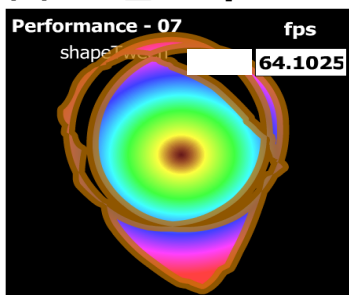
Software

IWAYAG, 48MHz

IWAYAG, 200MHz
(Estimated)



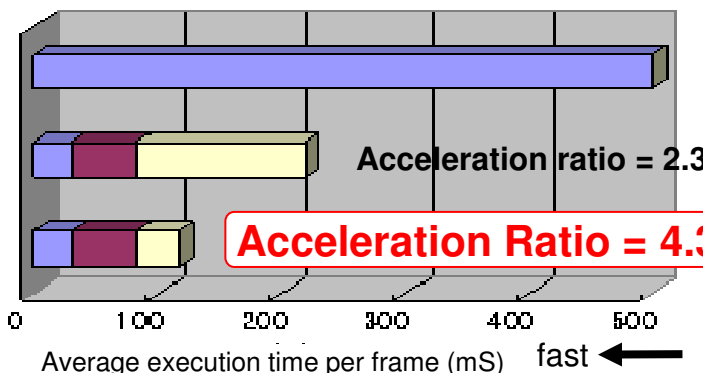
(6)007_shapeTween.swf



Software

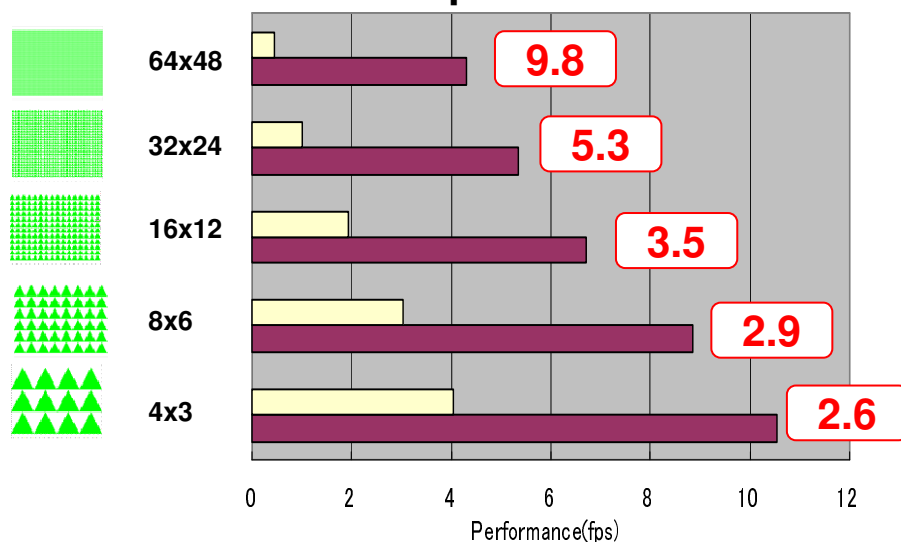
IWAYAG, 48MHz

IWAYAG, 200MHz
(Estimated)

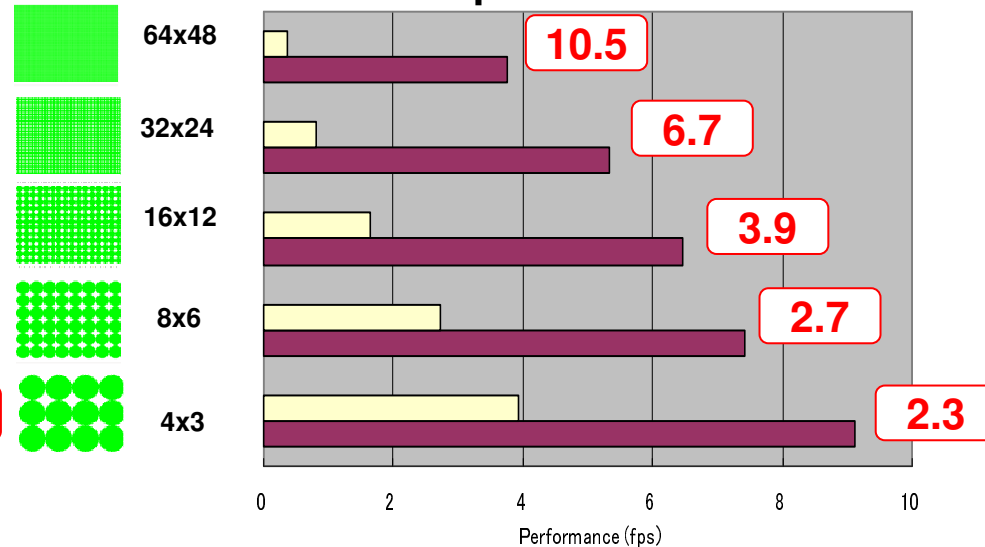


Performance Improvements on Flash Contents by IWAYAG (3)

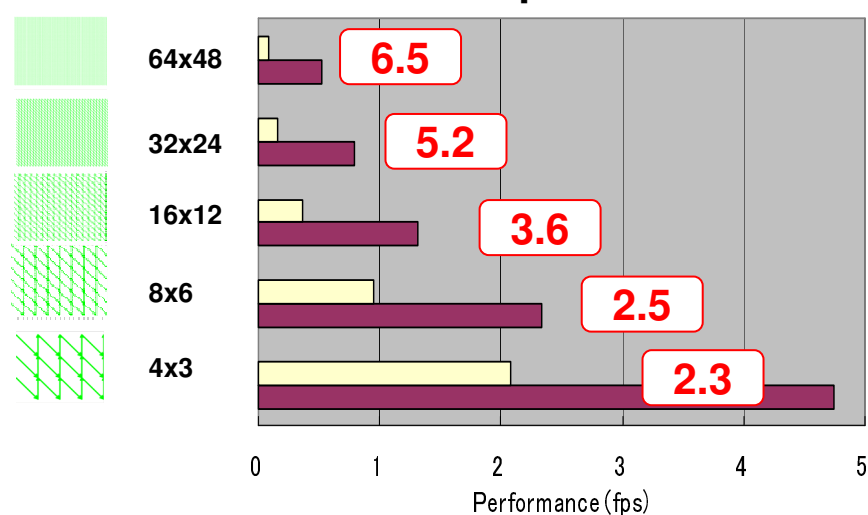
Fill Operation



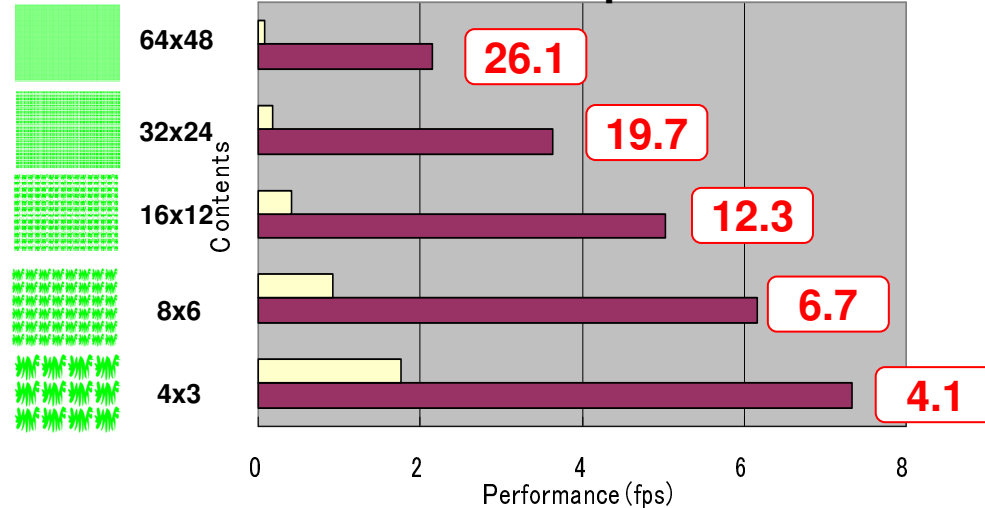
Arc Operation



Stroke Operation



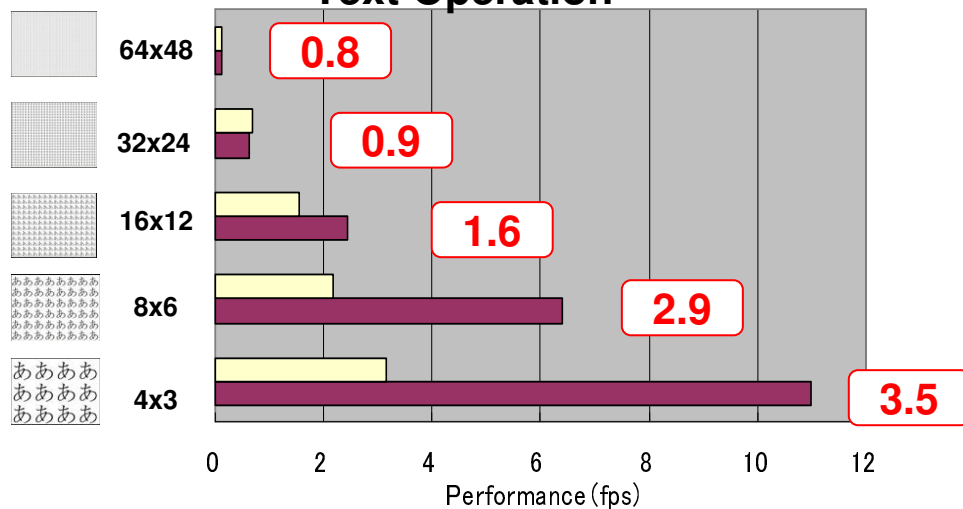
Bezier Fill Operation



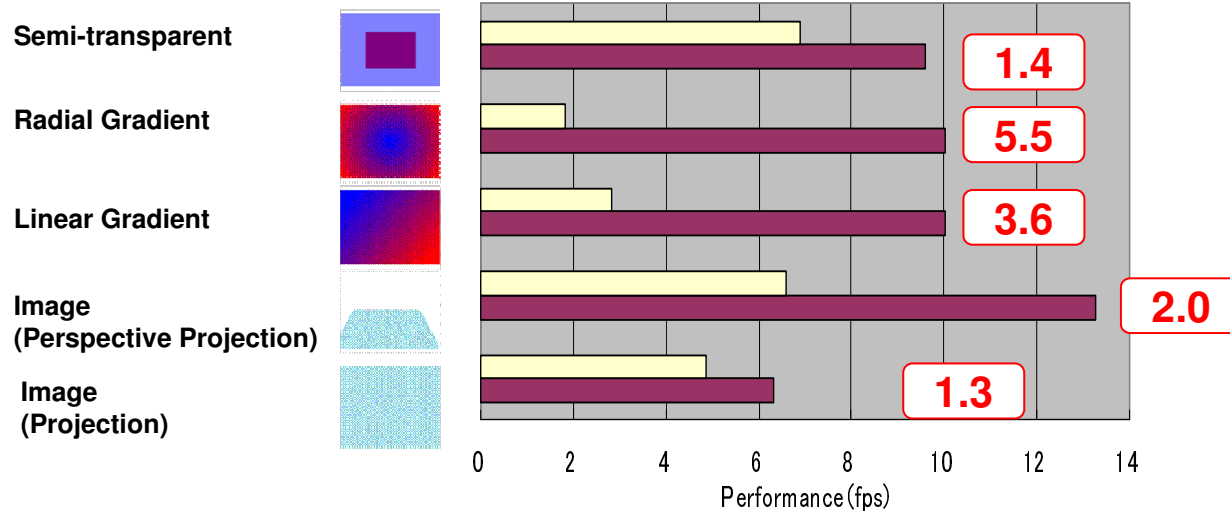
IWAYAG 48MHz
 Software
 value Acceleration Ratio

Performance Improvements on Flash Contents by IWAYAG (4)

Text Operation



Other Primitives



IWAYAG 48MHz

Software
value
Acceleration Ratio

Future Plan



Lowend products

- Smaller gate size
- Lower power consumption
- Lower IP cost

Highend products

- Improved OpenVG acceleration
- Support future versions of OpenVG
- 3D support (OpenVG+3D hybrid)
- Support variety of display devices
- Easier customization

Extends the rich UI by OpenVG and Flash to wider range of the devices

Empowered by Innovation

NEC