

Multimedia Solutions for OMAP2 & OMAP3

Bob Lee
Ingenient Technologies, Inc.



Agenda

- **I. OMAP Processors**
- **II. OMAP2**
- **III. OMAP3**
- **IV. Applications and Solutions**
- **V. Ingenient OMAP Roadmap**
- **VI. Ingenient Reference Design**
- **VII. OMAP2 Product Demo**

I. OMAP Processors

- Features
- Power Estimation
- Architectures

OMAP Features

- High multimedia performance
 - Standard definition resolution video (OMAP2) & high definition resolution video (OMAP3)
 - Rich peripherals
- Lower power consumption
 - Improved playing time for portable devices
 - Advanced power management
- 2D/3D Graphic Engine
 - 3D navigation devices becomes possible
 - 3D User Interface (SGX530: 10M triangle/sec)
 - PC-like 3D gaming experience
 - Picture-in-picture

Power Estimation

	Application	Setting	Power Usage
OMAP2	A/V Playback	H.264 BP VGA@30fps 3Mbps+Audio	283mW
	A/V Record	H.264 BP VGA@30fps 3Mbps+Audio	248mW
	Music Playback	MP3 44.1KHz@128Kbps Display off	29mW
OMAP3	A/V Playback	H.264 BP D1 @30fps 4Mbps+Audio	364mW
	A/V Record	H.264 BP D1 @30fps 4Mbps+Audio	606mW
	Music Playback	MP3 44.1KHz@128Kbps Display off	25mW

OMAP Architectures

	O2530	O2531	O3503	O3515	O3525	O3530
ARM	ARM11	ARM11	ARM Cortex	ARM Cortex	ARM Cortex	ARM Cortex
IVA	C64x Based	C64x Based			C64x Based	C64x Based
2D/3D Accelerator	OpenGL			OpenGL		OpenGL

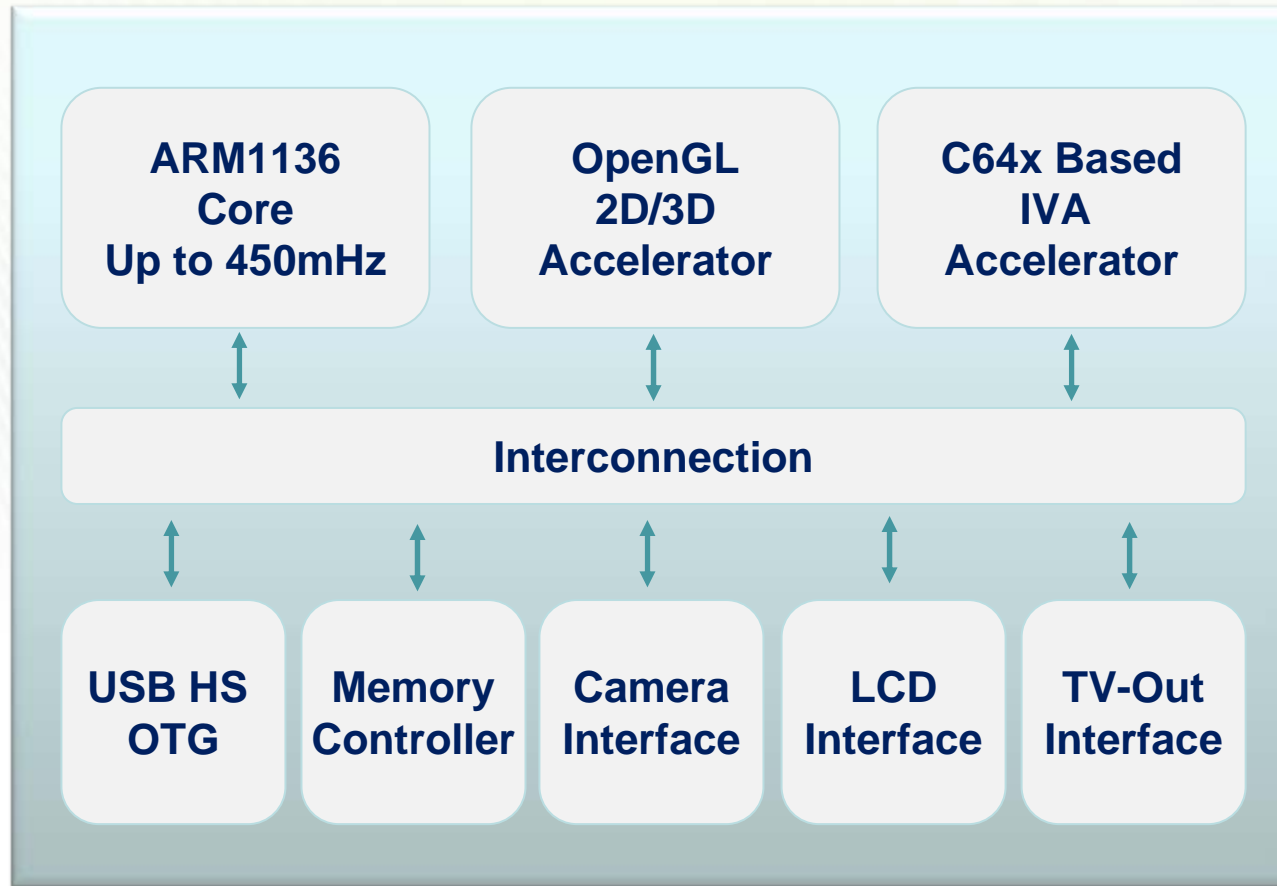
II. OMAP2

- Features
- Peripherals

OMAP2 Features

- 90nm CMOS technologies
- Processor
 - ARM11926 core, up to 450 MHz
 - TI C64x based Image/Video/Audio engine
- Graphics engine
 - 2D Vector
 - 3D Open GL
- Connectivity
 - USB OTG
 - SDIO x 2
- Memory
 - POP mDDR2
 - Standalone mDDR2
- Video and Image interface
 - Video in: video input and camera interface
 - Video output: dual LCDs or LCD and TV out

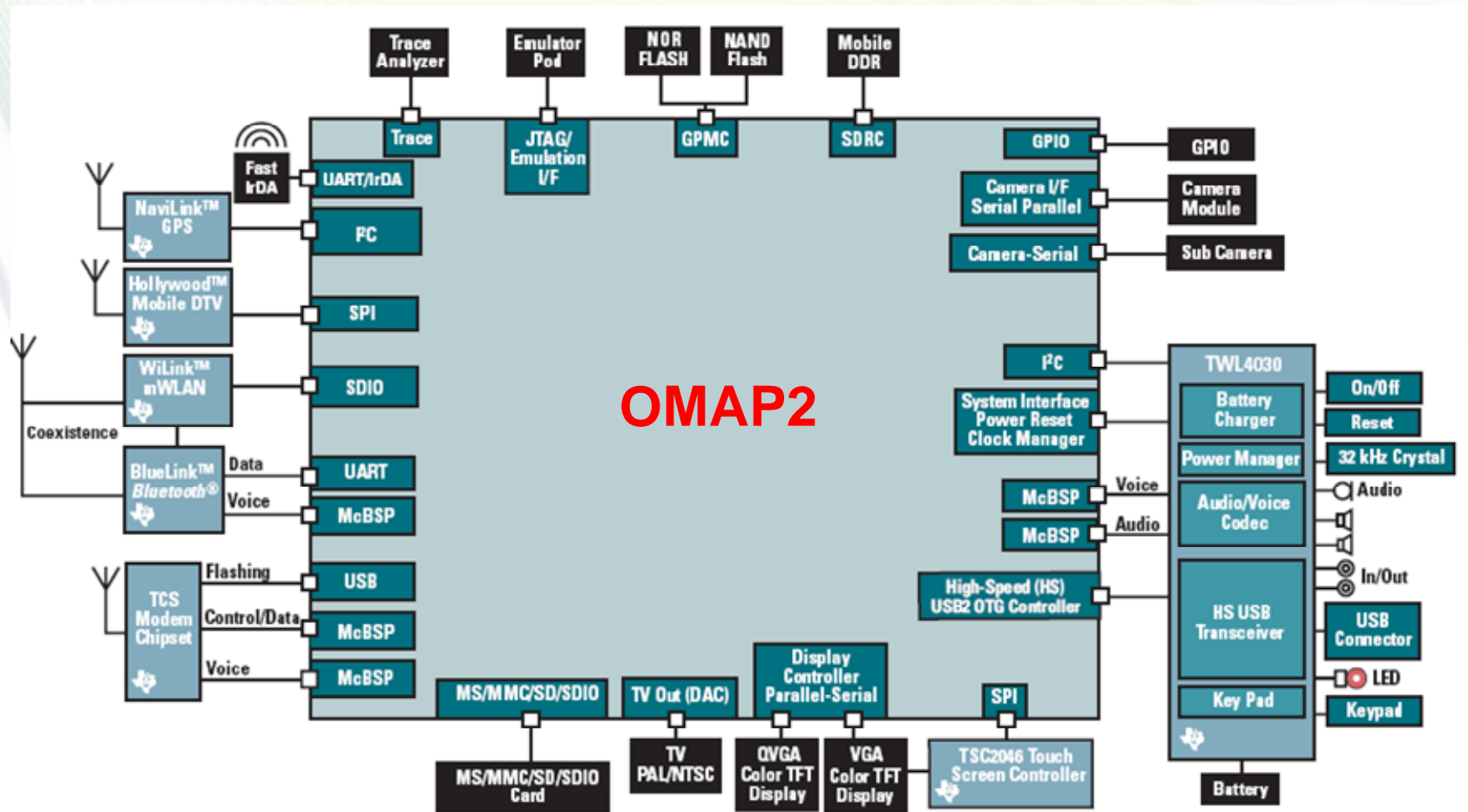
90 nm CMOS Technology



OMAP2 Peripherals

Peripherals	Interface
SPI	DTV, WiFi, touch screen
I2C	Touch screen, and other devices
UART	Serial communication, controls, IrDA
McBSP	Audio, voice, data, and controls
SDIO	SD Card, SDIO devices
GPMC	Memory devices, NAND flash and NOR flash
Clock	Real time clock and watch dog time
SDRC	Mobile DDR interface
GIO	GPIOs
Debug	JTAG, Trace

OMAP2 Peripherals



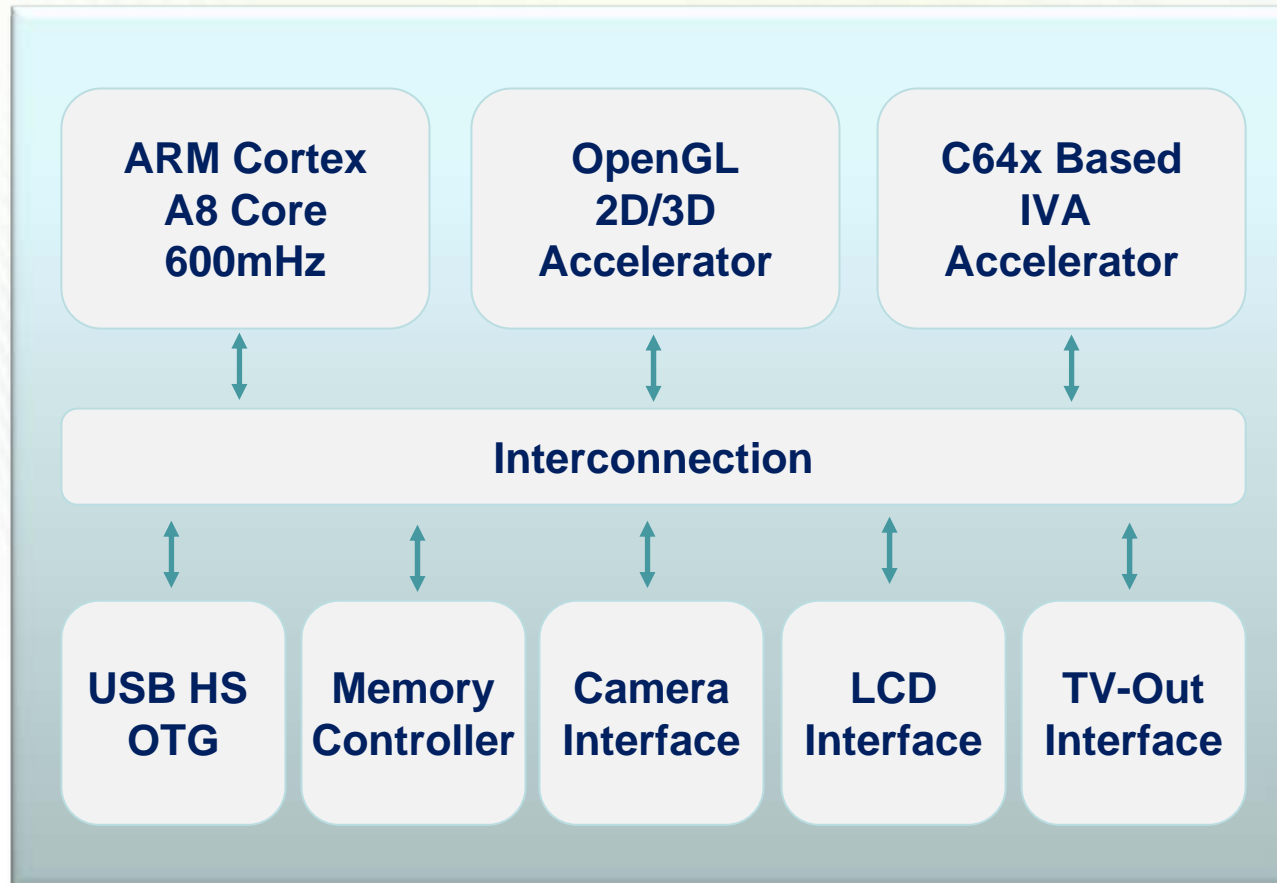
III. OMAP3

- Features
- Peripherals
- Architectures

OMAP3 Features

- 65nm CMOS technologies
- Processor
 - ARM Cortex A8 core, up to 600 MHz
 - TI C64x based Image/Video/Audio engine
- Graphics engine
 - 2D Vector
 - 3D Open GL
- Connectivity
 - USB OTG
 - SDIO x 2
- Memory
 - POP mDDR2
 - Standalone mDDR2
- Video and Image interface
 - Video in: video input and camera interface
 - Video output: dual LCDs or LCD and TV out

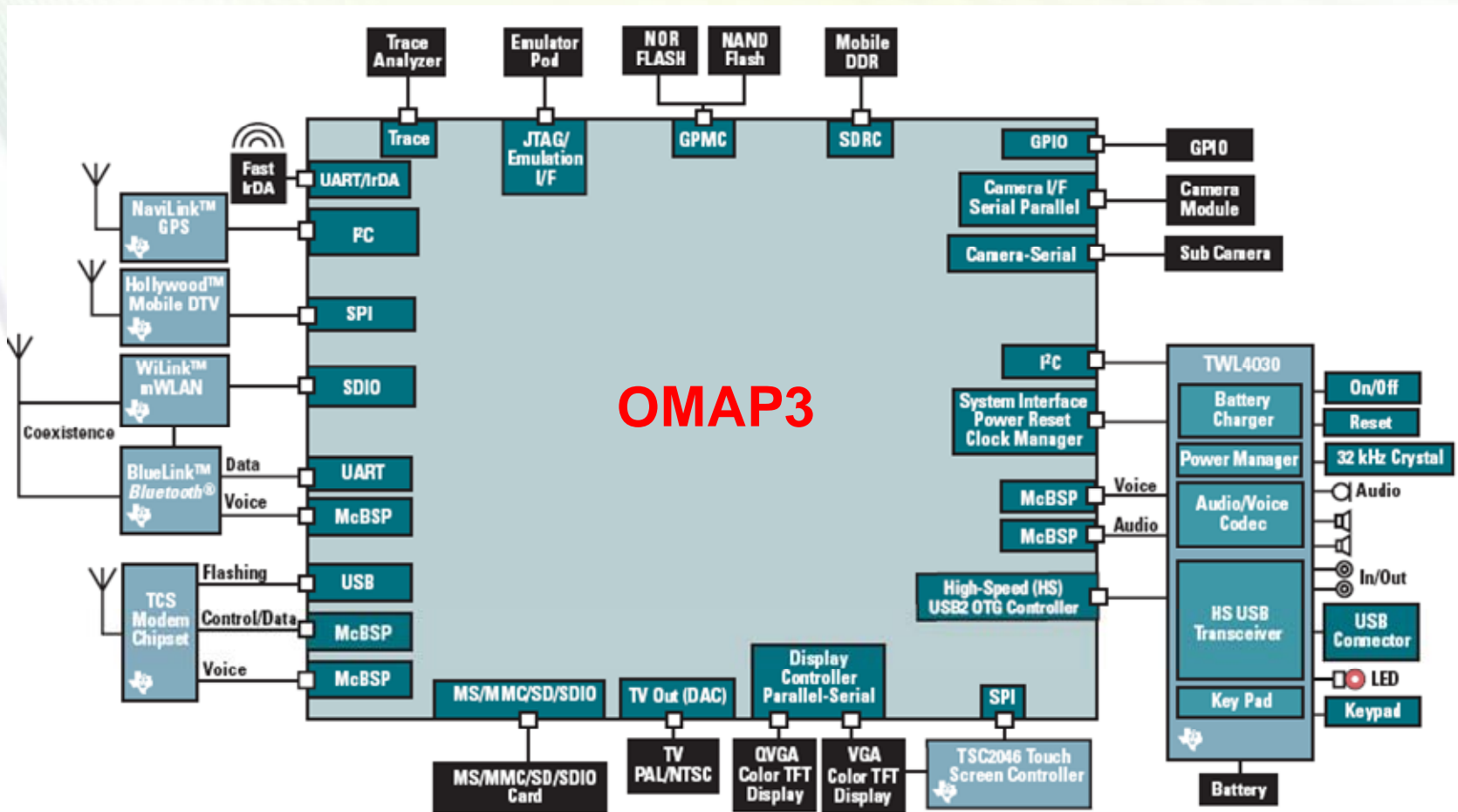
65 nm CMOS Technology



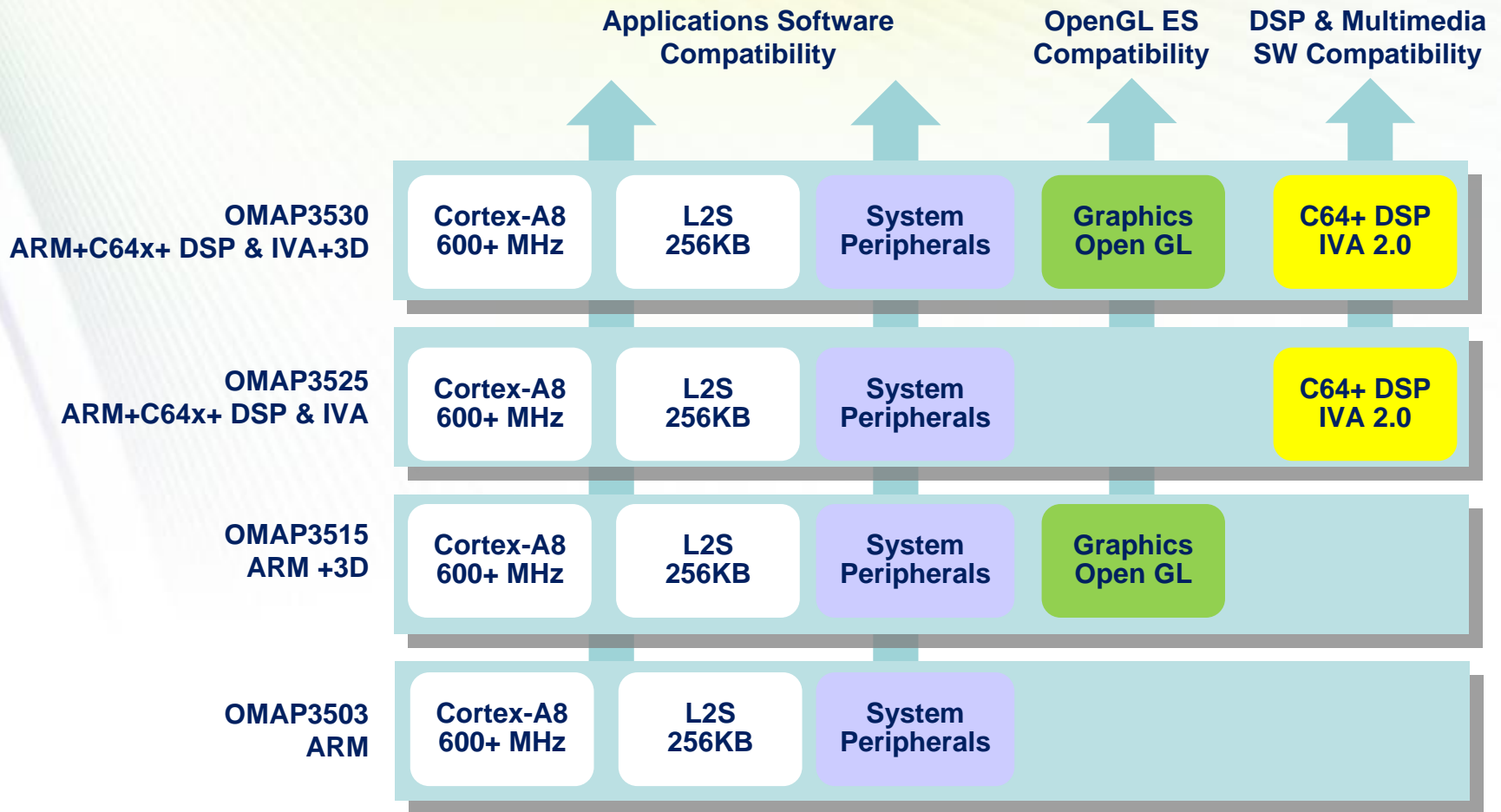
OMAP3 Peripherals

Peripherals	Interface
SPI	DTV, WiFi, touch screen
I2C	Touch screen, and other devices
UART	Serial communication, controls, IrDA
McBSP	Audio, voice, data, and controls
SDIO	SD Card, SDIO devices
GPMC	Memory devices, NAND flash and NOR flash
Clock	Real time clock and watch dog time
USB	USB OGT
SDRC	Mobile DDR interface
GIO	GPIOs
Debug	JTAG, Trace

OMAP3 Peripherals



OMAP3 Architectures



Flexible platform delivering highest quality multi-media.
Four pin-to-pin devices provide scalability for different applications.

OMAP3530 Architecture

Technology	0.065u CMOS
Very Powerful CPU Core	ARM Cortex A8N / 680MHz (Neon Technology) (= 1.2GHz ARM9)
DSP Core	C64x+ / 500MHz
2D/3D Graphic Core	SGX530 / 10M triangles/sec
ISP	Camera imaging Processor
ARM cache memory	16KB L1 I-cache / 16KB L1 D-cache; 256KB L2 U-cache
Internal RAM	64KB
External memory	DDR / m-DDR / SDRAM / m-SDRAM : 256MB NAND / NOR Flash : 1GB
Digital video In/Out	Digital - RGB 8:8:8 (2048*2048 Resolution) Analog – S-Video, CVBS
USB 2.0	High speed USB OTG 1
SD	SD I/O * 2 (SDHC)
Chip size	12*12 or 16*16
OS	WinCE / Linux
Companion Device	TWL5030, TPS659xx for PWM, USB PHY, LED, RTC, DC/DC and etc..

IV. Applications and Solutions

- Applications
- Solutions
- Graphics




OMAP Applications

Product Type	O2530	O2531	O3503	O3515	O3525	O3530
Portable Media Player (PMP)	✓	✓	✓	✓	✓	✓
Portable Navigation Device (PND)	✓	✓	✓	✓	✓	✓
Mobile Digital TV (mDTV)	✓	✓	✓	✓	✓	✓
Portable Medical Device (PMD)	✓	✓	✓	✓	✓	✓
Network Projector	✓	✓	✓	✓	✓	✓
WebCAM, IPCAM	✓	✓	✓	✓	✓	✓
Web Transmitter	✓	✓	✓	✓	✓	✓
Multimedia Internet Device (MID)			✓	✓	✓	✓
IPSTB (SD)			✓	✓	✓	✓
IPSTB (HD), IPTV					✓	✓
Home DMA					✓	✓
IP Video Phone					✓	✓

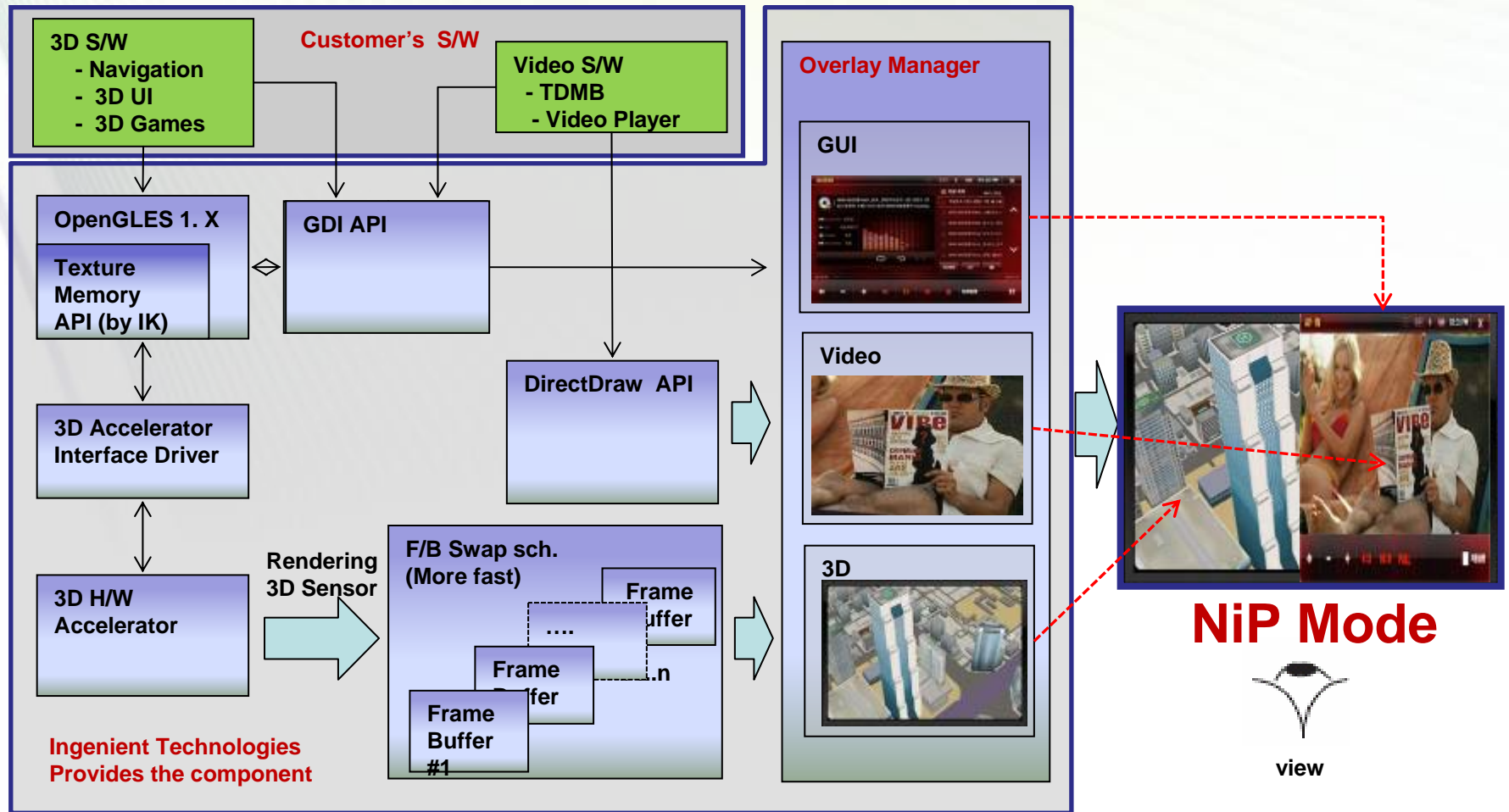
OMAP Solutions

Video Decoding	O2530	O2531	O3525	O3530
MPEG-1	SD Resolution Up to D1 (720 x 480)		SD and HD Resolution Up to 720p	
MPEG-2 MP				
MPEG-4 SP				
H.263 v1				
DivX 6				
XviD				
WMV9 SP				
H.264 BP				
On2 VP6.2				

OMAP Graphics

	O2530	O3515	O3530
2D/3D Graphics		 A 3D user interface showing a futuristic space station or satellite in orbit, with a transparent window displaying a 2D interface.	3D User Interface
		 A 3D navigation application showing a city street view with a red navigation path and a compass overlay.	3D Navigation
		 A 3D racing game showing a blue and red kart racing on a track with a sunset background.	3D Game

Navigation in Picture (NiP)



OMAP2 3D Real-time Performance

Bird View

Down Town : 4 ~ 5 fps

Normal Area: 8 ~ 10 fps



Dual View

Down Town : 3 ~ 4 fps

Normal Area: 6 ~ 8 fps



Drive View

Down Town : 10 ~ Limited fps

Normal Area: 10 ~ Limited fps



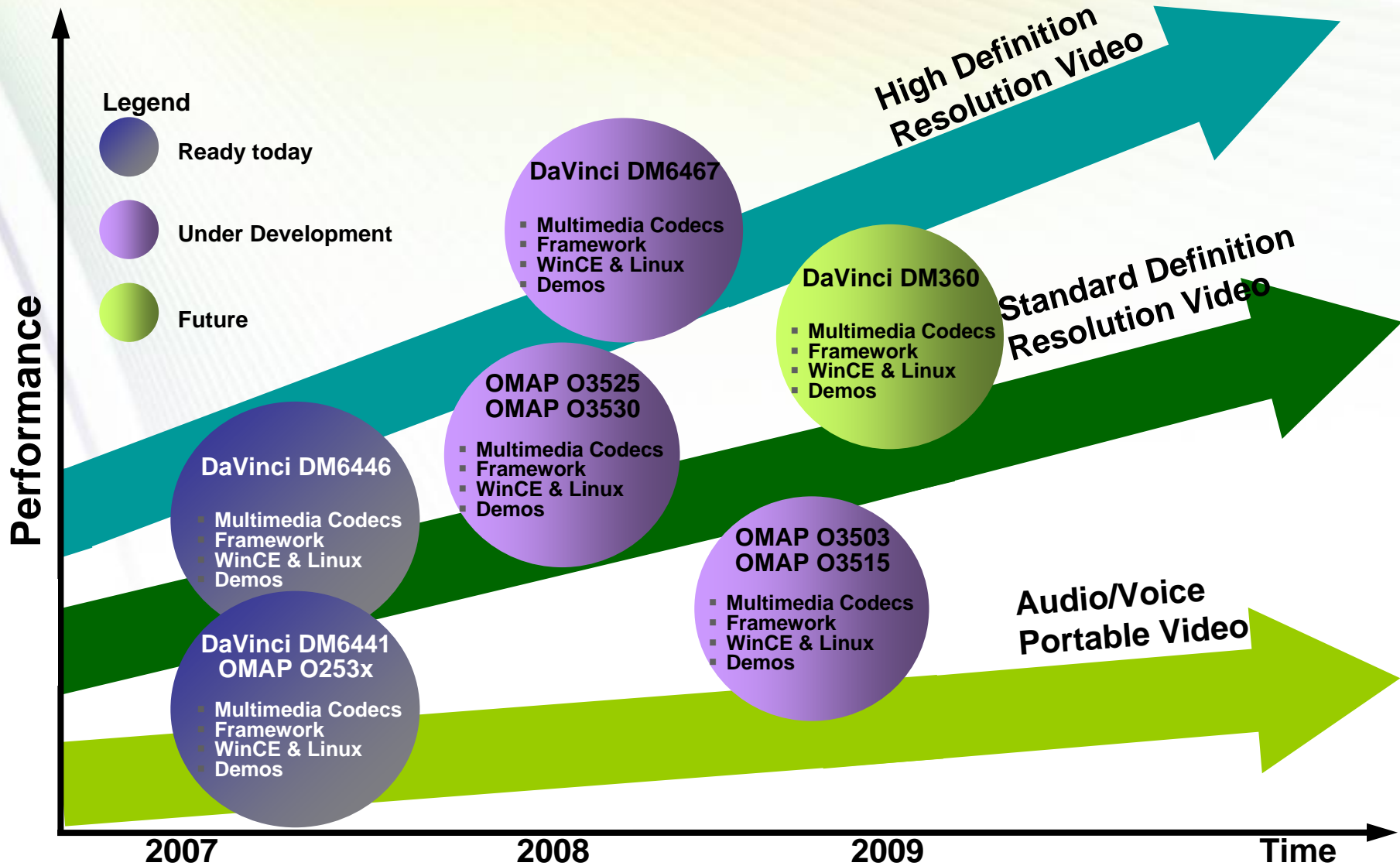
Top View

Down Town : 10 ~ Limited fps

Normal Area: 10 ~ Limited fps



V. Ingenient OMAP Roadmap



VI. Ingenient Reference Design

OMAP2 Reference HW Design

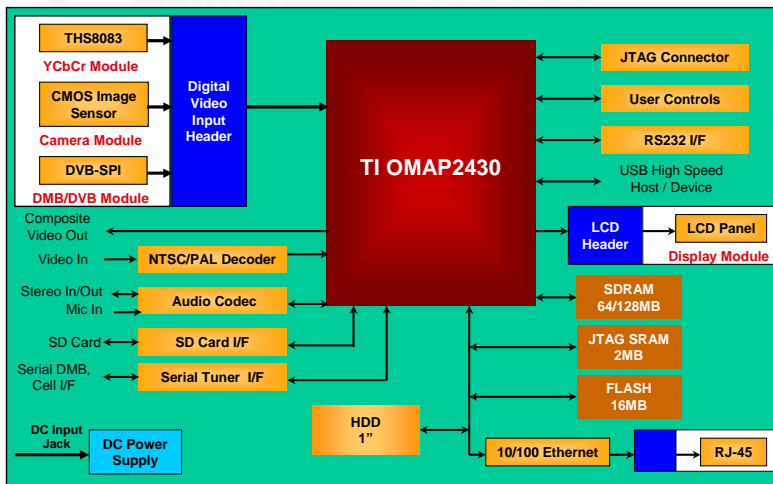


Applications

- ISDB-T / TDMB / SDMB / DVB-H Receiver
- 3-Play Phone
- Portable IPVP
- PMP, PND, mDTV
- Medical Device

Functionality

- MPEG-4 SP /MP3 Encode: up to 30fps D1
- MPEG-4 SP / AAC Encode: up to 30fps D1
- MPEG-4 ASP / AAC Encode: up to 30fps D1
- H.264 BP / AAC+SBR Encode: up to 30ps ½D1
- H.264 BP / AAC+SBR Decode: up to 30fps D1
- H.264 BP / BSAC Decode: up to 30fps D1
- DivX / MP3 or AC-3 Decode: up to 30fps D1
- WMV / WMA Decode: up to 30fps VGA
- JPEG Image Capture: Up to 12Mpixel Class



OMAP3 Reference HW Design

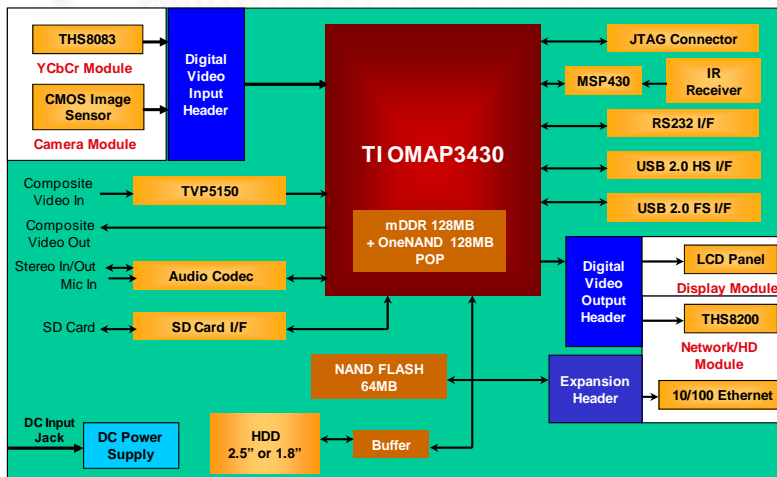


Applications

- mDTV enabled Smart Phone
- Low Power Hi-Definition PMD (PND+mDTV+PMP)
- Portable IVPV
- Network Projector
- Multimedia Internet Device

Functionality

- MPEG-4 SP / AAC Encode: up to XGA / 30
- MPEG-4 SP / AAC Decode: up to 720p / 30
- MPEG-2 MP / AC-3 Decode: up to 720p / 30
- H.264 BP / AAC HE Encode: up to D1 / 30
- H.264 BP / AAC HE Decode: up to 720p / 30
- H.264 BP / BSAC Decode: up to 720p / 30
- DivX / MP3 or AC-3 Decode: up to 720p / 30
- VC-1 / WMA Decode: up to D1 / 30
- JPEG Image Capture: Up to 15Mpixel Class



Low Power Media Player



Features:

Advanced Power Management

- Long Lasting Battery Life
 - 8 Hours of Movie Playback
 - 24 Hours of Audio Playback
- Sleep & Wake-up Mode
- LCD Backlight Control

Movie & Audio Player

- Market Leading Quality Video
- Crystal Clear Sound & Stable Operation

Compact Design

- Thin, Light and Cool Body
- Touch Screen

Storage Support

- Support for Large Capacity Media
- Solid State / Flash Memory
- Fast Read / Write to the Mass Storage

Wireless Connectivity

- 802.11 a / b / g

Production Ready Solution

- Certified reference design including industrial design available with embedded application software

Specifications:

Video Standards

- H.264 BP / MP
- MPEG-4 SP / ASP
- MPEG-2 MP@ML
- WMV
- DivX

Audio Standards

- MPEG-4 AAC-LC, AAC+SBR Ver. 2
- Dolby AC-3
- MPEG-1 Layer 1, 2 and 3
- WMA

Image Standards

- MJPEG
- JPEG
- BMP
- GIF
- TIFF
- PNG

Storage Devices

- USB 2.0 Memory Stick

Connectivity

- 802.11 1 / b / g

OS

- WinCE 5.0 / 6.0
- Linux 2.6

Navigation Entertainment



Features:

Portable Navigation

- Maps Available in English, Japanese, & Korean

3D Graphics

- Advanced 3D Graphics

Multimedia Playback & Record

- Market Leading Quality

Graphical User Interface

- Easy to use and fun to navigate!

Trick Play

- Fast-forward, Rewind & Pause

Power Management

- Designed with Advanced Power Management Features

Wireless Connectivity

- 802.11 a / b / g

Mobile DTV Receiver

- Support for ISDB-T, T-DMB, DVB-H, DVB-T and more

Integrated Solution

- Certified reference design including color LCD and speech recognition with embedded application software

Specifications:

Video Recording Standards

- H.264 BP / MP
- MPEG-4 SP / ASP
- MPEG-2 MP@ML

Video Playback Standards

- H.264 BP / MP
- MPEG-4 SP / ASP
- MPEG-2 MP@ML
- DivX V 3.11 / 4.x / 5.x / 6.x
- WMV 7 / 8 / 9 / VC-1
- QuickTime 6 / 7

Audio Standards

- MPEG-4 AAC-LC, AAC+SBR Ver. 2
- Dolby AC-3
- MPEG-1 Layer 1, 2 and 3
- WMA
- Ogg Vorbis
- Voice (G.7xx)

Image Standards

- MJPEG / JPEG / BMP / GIF / TIFF / PNG / JPEG2000

DRM

- DRM10 / DivX

Storage Devices

- Hard Disk Drive
- SD Card / MMC Card
- USB Memory Stick

OS

- WinCE 5.0 / 6.0 or Linux

3D Graphics



Features:

3D Graphics Applications

- Personal Media Players
- Karaoke Devices
- Personal Navigation Devices
- Mobile Phones and Mobile DTVs
- Set-Top Boxes
- SD & HD Internet Protocol TVs
- HD DVD and Blue-Ray DVD

Advanced 3D Graphics Capability for

- User Interface
- Navigation
- Mobile Internet Contents
- Gaming, Gambling, and more

Open GL ES 1.1

- Bring Vibrant Dynamics and Improved Visual Quality

3D PiP Library

- Simultaneous 3D Navigation + DMB
- 3D Navigation + Mobile DTV Receiver (ISDB-T, T-DMB, and DVB-H/T)

Specifications:

2D / 3D Accelerator

- MBX L + VGP L (1M Polygons/sec)
- SGX530 (1+M Polygons/sec)

Video Recording Standards

- H.264 BP
- MPEG-4 SP / ASP
- MPEG-2 MP@ML
- MPEG-1

Video Playback Standards

- H.264 BP / MP
- MPEG-4 SP / ASP
- MPEG-2 MP@ML
- DivX V 3.11, 4.x, 5.x, & 6.x
- WMV 7 / 8 / 9 / VC-1
- QuickTime 6 / 7
- MPEG-1

Audio Standards

- MPEG-4 AAC-LC, AAC+SBR Ver. 2
- Dolby AC-3
- MPEG-1 Layer 1, 2 and 3
- WMA
- Ogg Vorbis
- Voice (G.7xx)

Image Standards

- MJPEG / JPEG / BMP / GIF / TIFF / PNG / JPEG2000

OS

- WinCE 5.0 / 6.0
- Linux

Network Projector



Features:

Remote Desktop Protocol (RDP) Functionality

- Network access and control over any network projector via any networked PCs

Wireless & Wired Connectivity

- Supports Wireless 802.11a / b / g

Web Browsing

- Internet Explorer or Opera

Support for High Resolution Images

- VGA, SVGA, XGA, SXGA, WXGA
- 720p / 1080i HDTV

Advanced Functionalities

- Video Session Control
- Unicast / Multicast (IGMP)
- Multimedia Playback

Specifications:

Video Standards

- H.264 BP / MP
- MPEG-4 SP / ASP
- MPEG-2 MP@ML
- WMV

Audio Standards

- MPEG-4 AAC-LC, AAC+SBR Ver. 2
- Dolby AC-3
- MPEG-1 Layer 1, 2 and 3
- WMA

Image Standards

- JPEG
- BMP
- GIF
- TIFF
- PNG

Connectivity

- Ethernet (10 / 100 / 1,000 Mbps)
- 802.11 a / b / g

OS

- WinCE 5.0 / 6.0
- Linux

VII. OMAP2 Product Demo



OMAP2 PND+PMP+DTV



- **Model:** Thinkware/K2
- **Platform :** OMAP2530
- **OS :** WinCE5.0
- **LCD :** 4.8", WVGA (800*480)

Contact:

China, Hong Kong, Taiwan, and Singapore

Bob Lee

Director of APAC Sales and New Business Development

bob.lee@ingenient.com

Ingenient Technologies, Inc.

Korea

J.G. Lee

General Manager of Ingenient Korea

jg.lee@ingenient.com

Ingenient Korea Co., Ltd.

Thank you!

