Technical Oriented Presentation of SiS 550/2

Information Appliance Product Division
Silicon Integrated Systems Corporation
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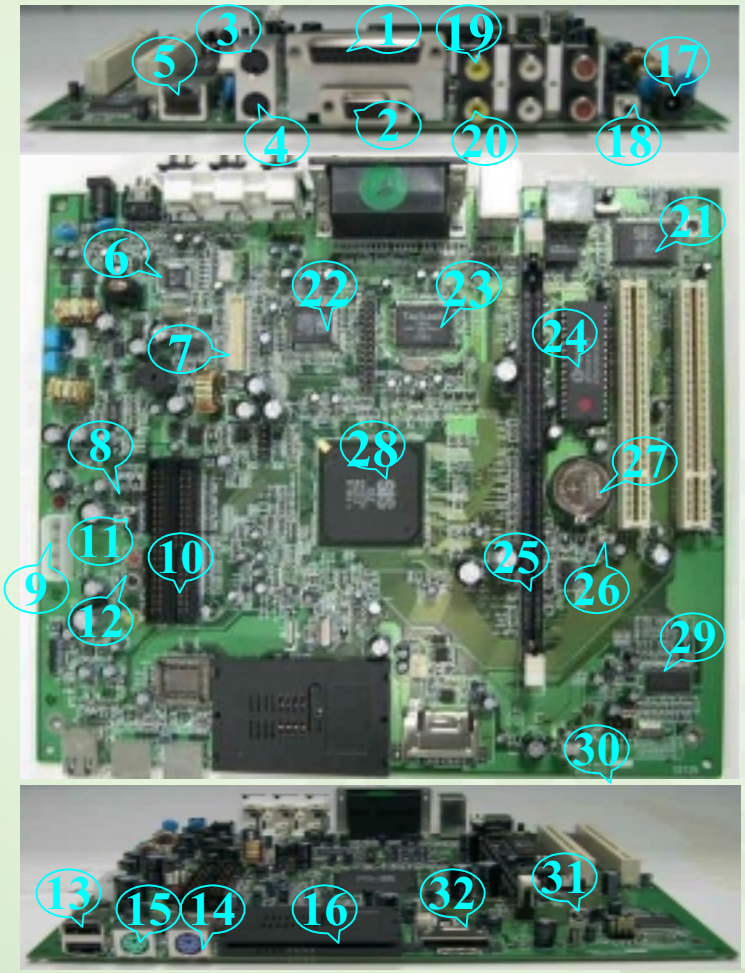
SiS 55X Development Kit
Evaluation Board

1.Printer port
2.VGA out Dsub-15
3.S-video in
4.S-video out
5.10/100 Fast Ethernet
6.Audio Codec AD1881
7.TTL TFT / DSTN interface
8.Digital Audio out
9.IDE device power out
10.IDE Device (1 channel)
11.CPU Clock rate setting
12.Power on / Reset button
13.USB port
14.PS/2 keyboard
15.PS/2 Mouse
16.Smart Card Slot



17.DC 12V power in
18.Audio speaker out
19.TV AV in
20.TV AV out
21.SiS900 Fast Ethernet Chip
22.SiS 301 TV out
23.TW 98 TV decoder
24.Flash ROM / DOC
25.PC 133 SDRAM
26.Clear CMOS jumper
27.RTC Battery
28.SiS 552 SOC
29.Clock Gen. 951901
30.Host clock rate setting
31.CIR Receiver
32.Memory Stick Slot

SiS 55X Development Kit (cont')
Technical Documents #1

1. 55x EVALUATION BOARD SYSTEM SETUP.doc

Teach how to set up WinCE or Linux system image on the evaluation board for the testing of various functions such as DVD playback, MP3 playback, Internet browser, Memory Stick, CIR, TV out, LCD panel, etc.

2. Datasheet and Design Guide

Detailed spec list; a must read before the design and layout of a PCB.

3. 550toLCD_.doc and PANEL LIST.doc

DSTN / TTL TFT panel connector pin assignment, and the list of panels that have been employed by SiS55x.

4. SS72B.xls

SS72B evaluation board Bill of Material.

SiS 55X Development Kit (cont')
Technical Documents #2

5. SiS552 VIP.doc

Teach how to set up video input port.

- ✓ CCIR656 standard mode
- ✓ 8-bit SPI mode 1, 2 (special mode supported by Conexant only)
- ✓ 8-bit YUYV interleave mode .

6. ss72B.brd

Evaluation board layout file for the Allegro layout tool.

7. AP Notes

- ✓ 301 to SCART TV
- ✓ 55x to Mini PCI
- ✓ 55x support DOC flash
- ✓ Connect to ATX power
- ✓ How to Use Compact Flash
- ✓ No Standby Power design (power sequence
- ✓ remove redundant part
- ✓ SDRAM on board
- ✓ LPC Super IO to RS232

SiS 55X Development Kit (cont')
Technical Documents #3

8. Development Environment For 55X.pdf

Teach how to port SiS 55x drivers (LAN, VGA mode setting, audio, Memory Stick, etc.) on a Linux or WinCE.NET environment.

9. LinuxIA_FB_080.pdf

Describe the software specification of SiS Frame Buffer device driver for Linux, including system architecture, environment and features of SiS Frame Buffer device driver.

10. SiS LinuxDVD API 0.72.PDF / SiSDVD_CE.doc

Released under NDA. A hardware MPEG-2 accelerator porting guide for Linux or WinCE. A must read to develop a DVD player or a MPEG-2 streaming application.

SiS 55X Development Kit (cont')
Technical Documents #4

11.Register List

Released under NDA. List of all registers of SiS55x including those for core logic, graphics, PCI IDE configuration, legacy device, LPC bus, USB, AC97, ACPI, SMBUS, etc; an important document for BIOS porting.

SiS 55X Development Kit (cont')

WinCE / Linux Image

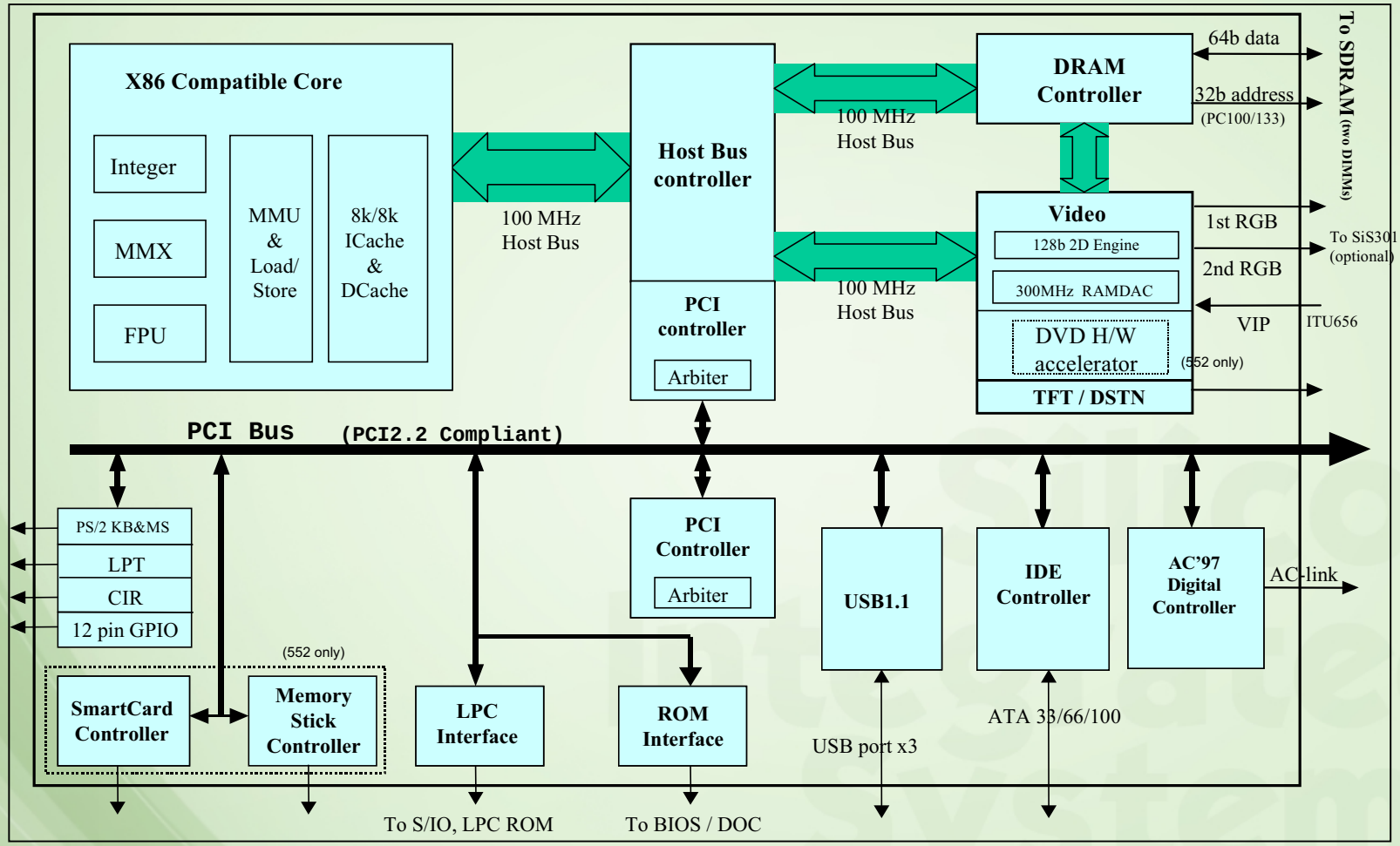
WinCE 3.0 / 4.0 / 4.1 image function list

- ✓ Windows Media Player playing CD, mp3, avi…
- ✓ WinCE WinDVD playing DVD titles
- ✓ Internet Explorer
- ✓ TV out
- ✓ Remote K/B M/S, CIR (Silitek SK-7500 remote keyboard)
- ✓ TV-in preview (VIP function by TW98)
- ✓ Memory Stick
- ✓ DHCP (dynamic IP) ready
- ✓ Driver and BSP file ready

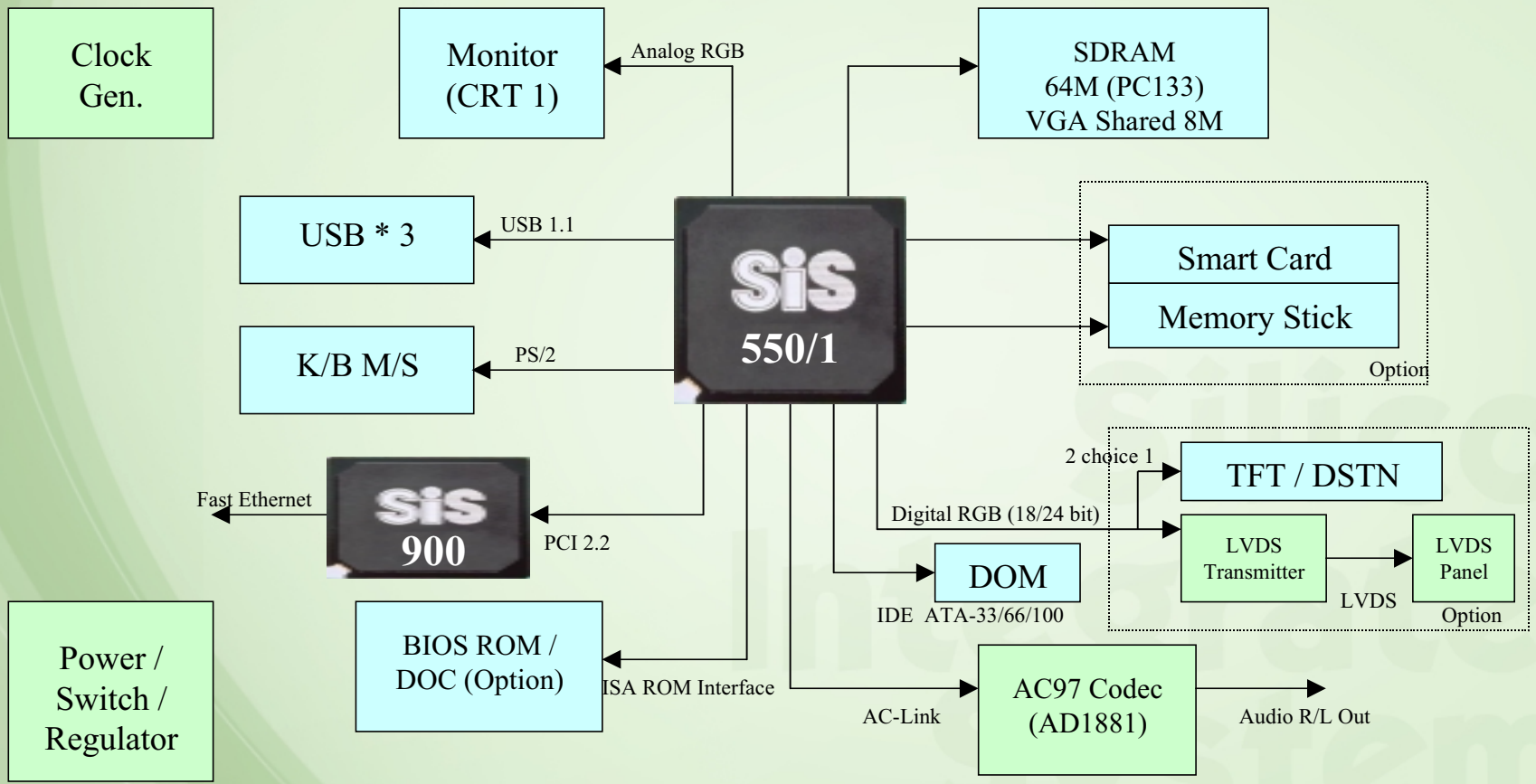
Linux image function list

- ✓ SiS browser support (based on Mozilla)
- ✓ Linux WinDVD playing DVD titles
- ✓ JVM support
- ✓ Flash 5.0 plug-in
- ✓ SSL3.0 support
- ✓ MP3 player
- ✓ Picture view (JPG, BMP,GIF)
- ✓ Chinese font (big-5)
- ✓ Remote K/B M/S, CIR (Silitek SK-7500 remote keyboard)
- ✓ E-mail

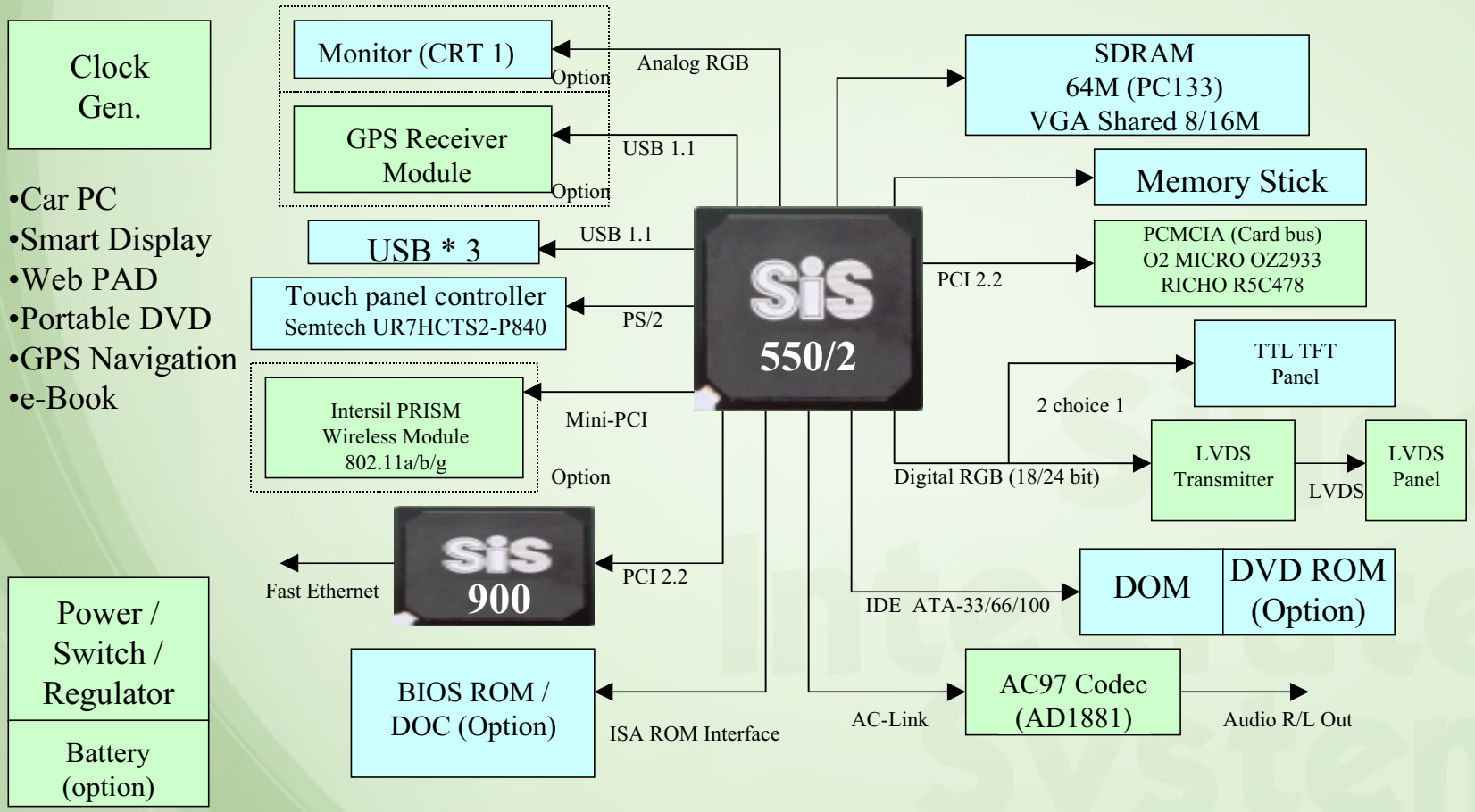
Internal Block Overview



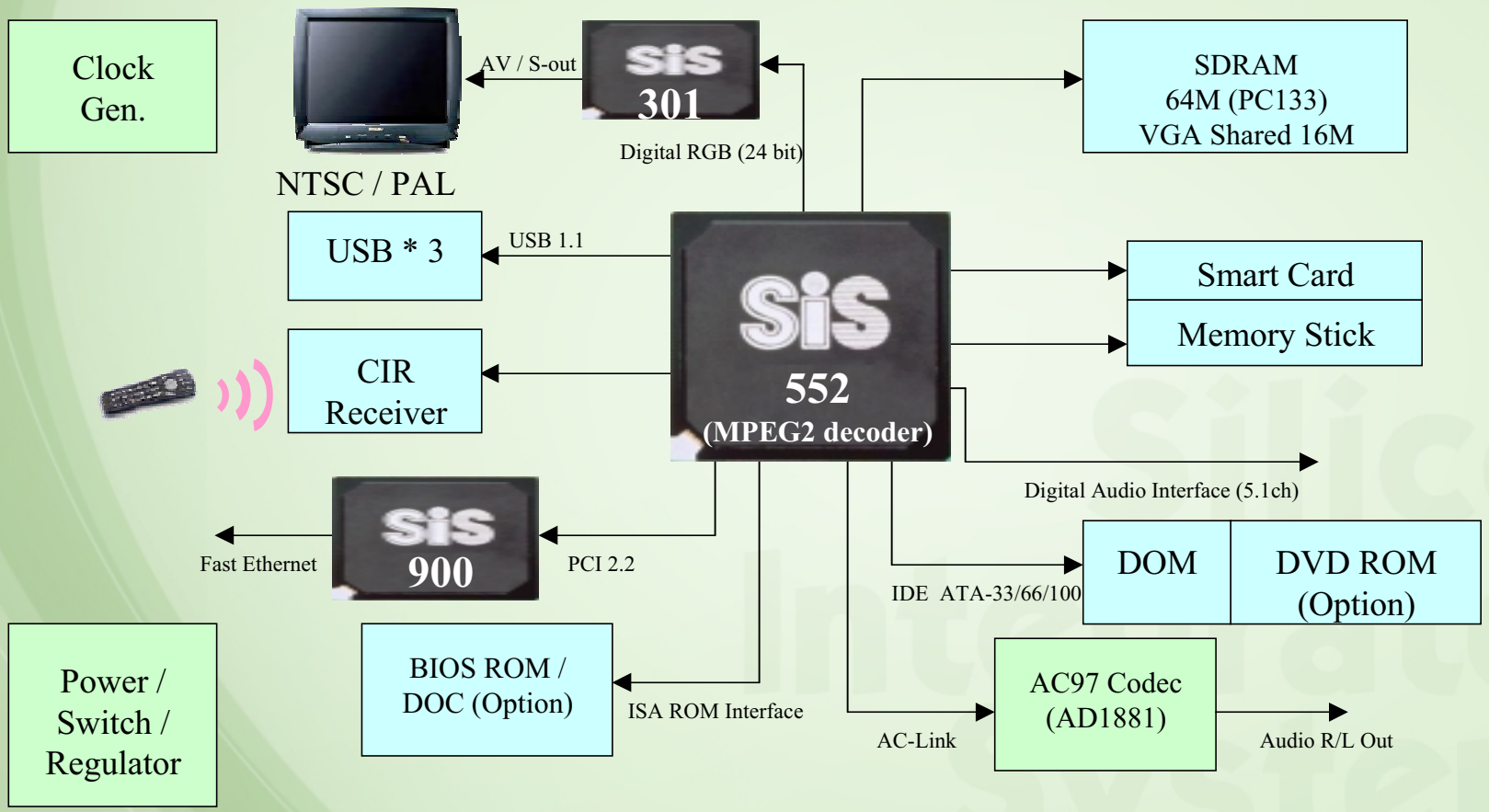
System Solution Block Diagram
Thin Client



System Solution Block Diagram
PAD Base Application

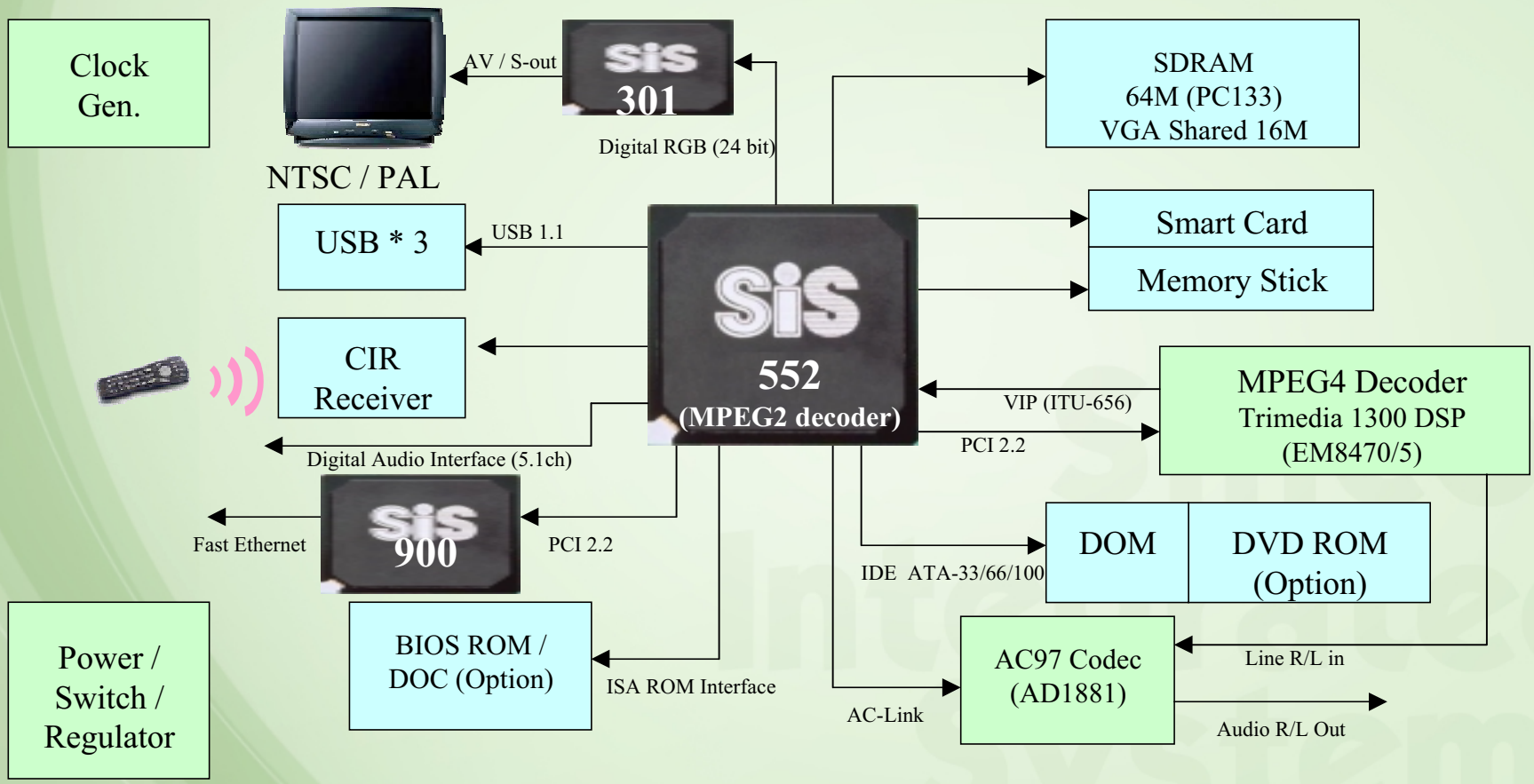


System Solution Block Diagram
MPEG1/2 STB for VOD



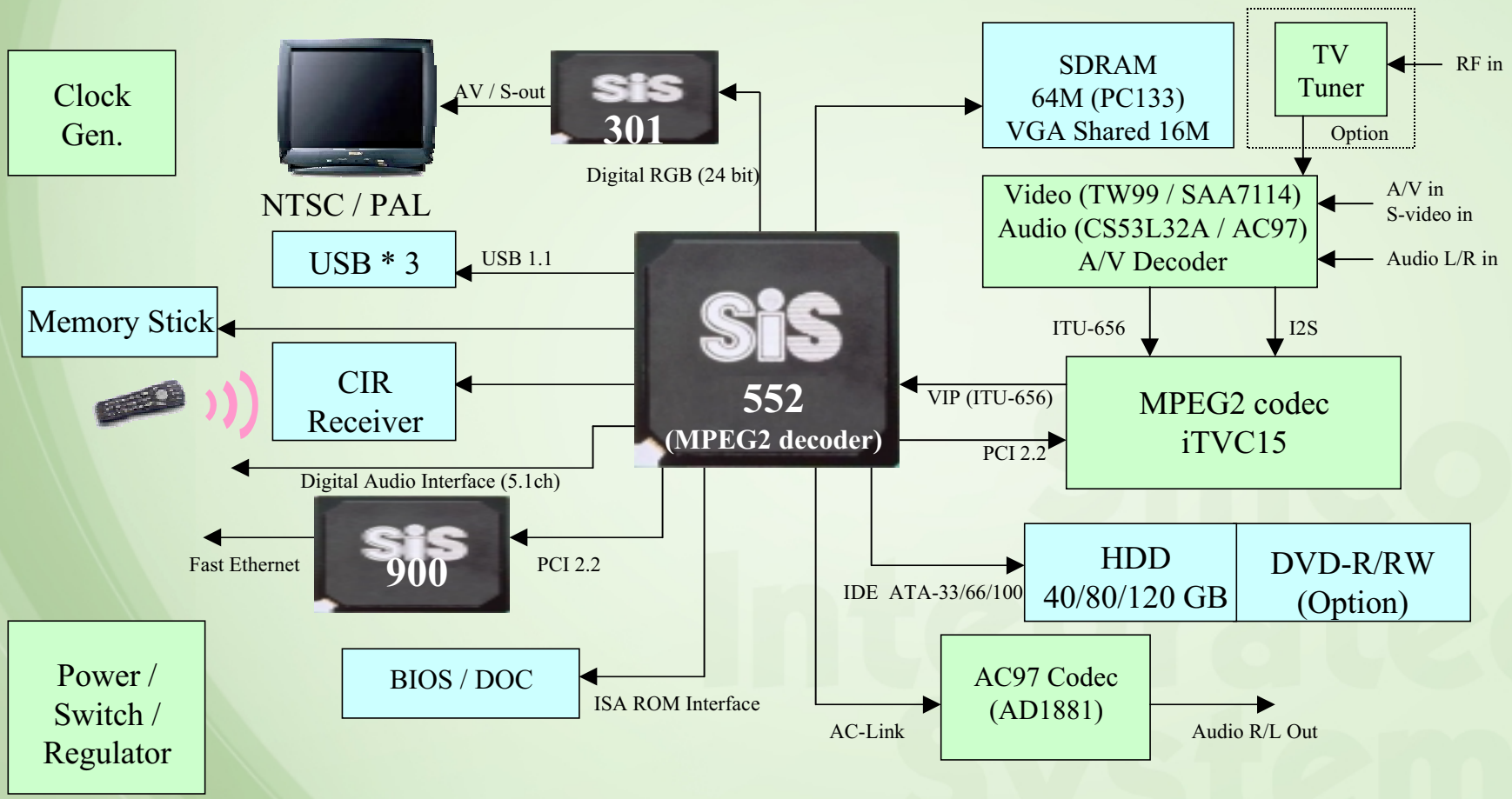
System Solution Block Diagram

MPEG1/2/4 STB for VOD

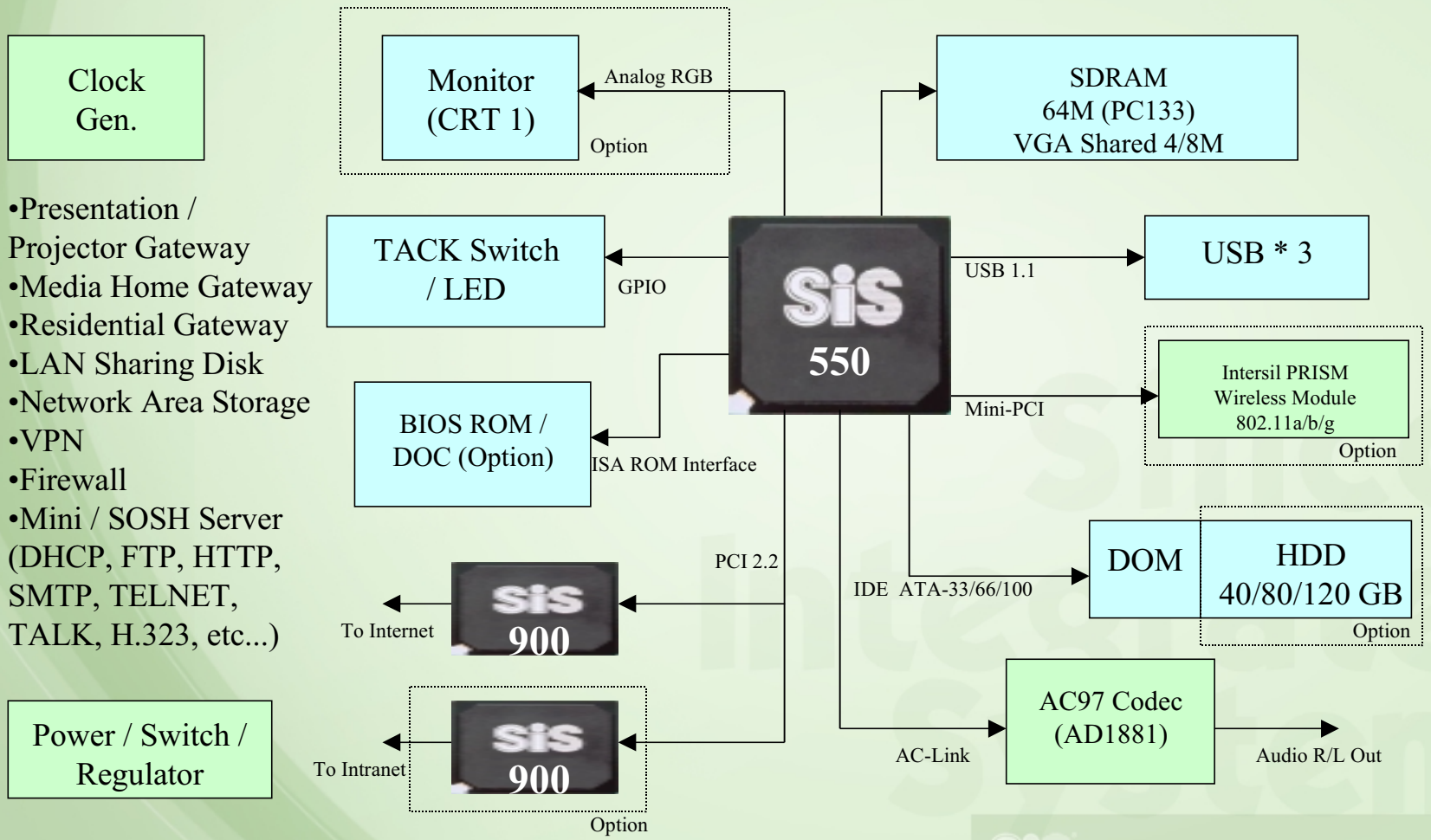


System Solution Block Diagram

PVR / DVR



System Solution Block Diagram
Internet Access Device



Design Advantages of SoC

SoC

- Easy layout (4 layer PCB)
- Low power consumption (3.8W Max.)
- High MP yield rate
- High reliability
- Low system BOM cost
- Small form factor
- Longer battery life for handheld device

Non-SoC

- Hard to layout in 4 layer PCB
- Total power >14W (CPU+NB+SB)
- Low MP yield rate
- Low reliability
- High system BOM cost
- Large form factor
- Hard to design for handheld device

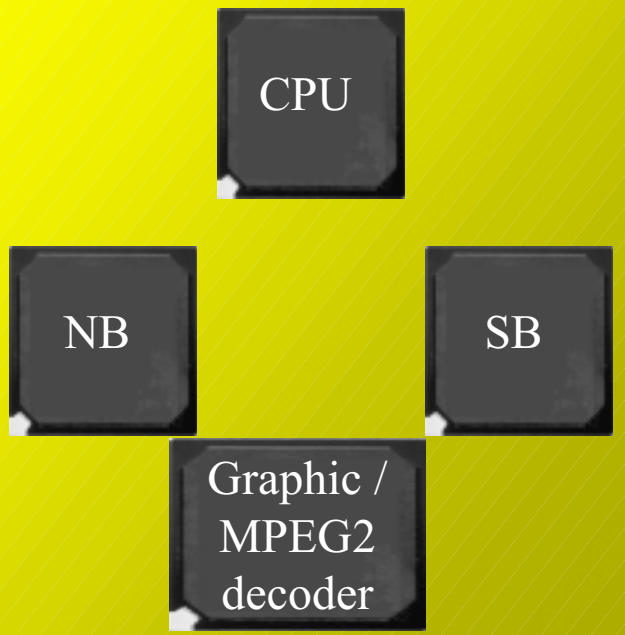
Design Advantages of SoC (cont')

SoC

- **Total 686 pins**
- **CPU+NB+SB+ MPEG2 decoder + 2D Graphic**

Non-SoC

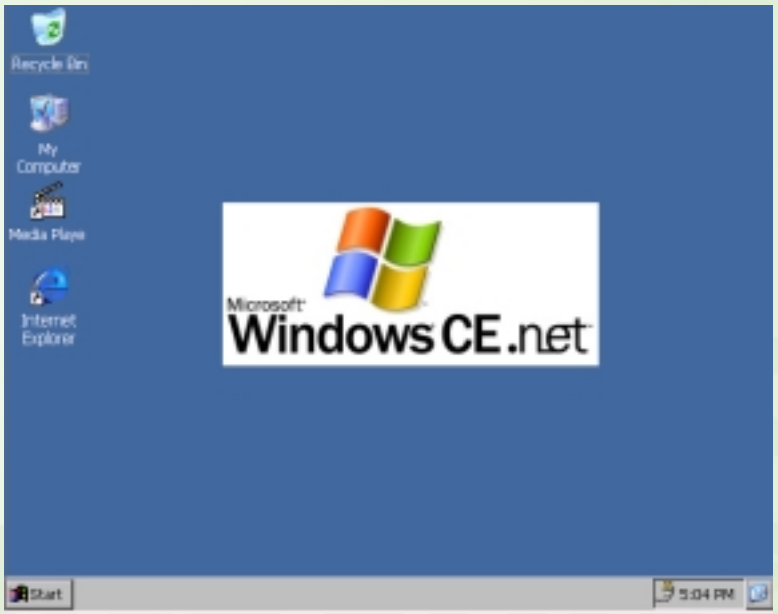
- **> 1400 pins**



SiS Software Platforms

Linux running on SiS55x

WinCE running on SiS55x



Linux Solution

SiS Linux Package Features:

LinuxBIOS

-SiS created the world first working LinuxBIOS
-Enabling system to boot within 3 seconds

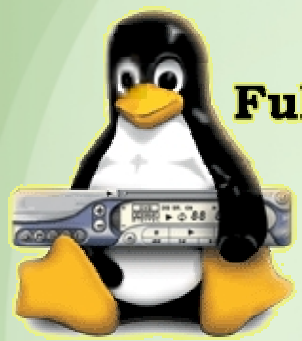
-Kernel version 2.4.2, 2.4.18, 2.4.19
-Support 2D accelerated TinyX window
-System bundled in 16MB

Linux 2.4

SiS Flexibility

-Flexible
-Featuring SiS Linux on DOM, DOC

Linux Solution (cont')



Full Functions

Multimedia

VCD, CD, MP3, Hardware accelerated DVD

Also Featuring **Video On Demand**

multimedia powered by InterVideo

Web Browser

HTML3.2/4.0, SSL3.0, HTTP1.1 protocol

Java1.1 and Cookie, Multiple language fonts, Chinese Input

Java Script, Java Virtual Machine, Flash 5.0

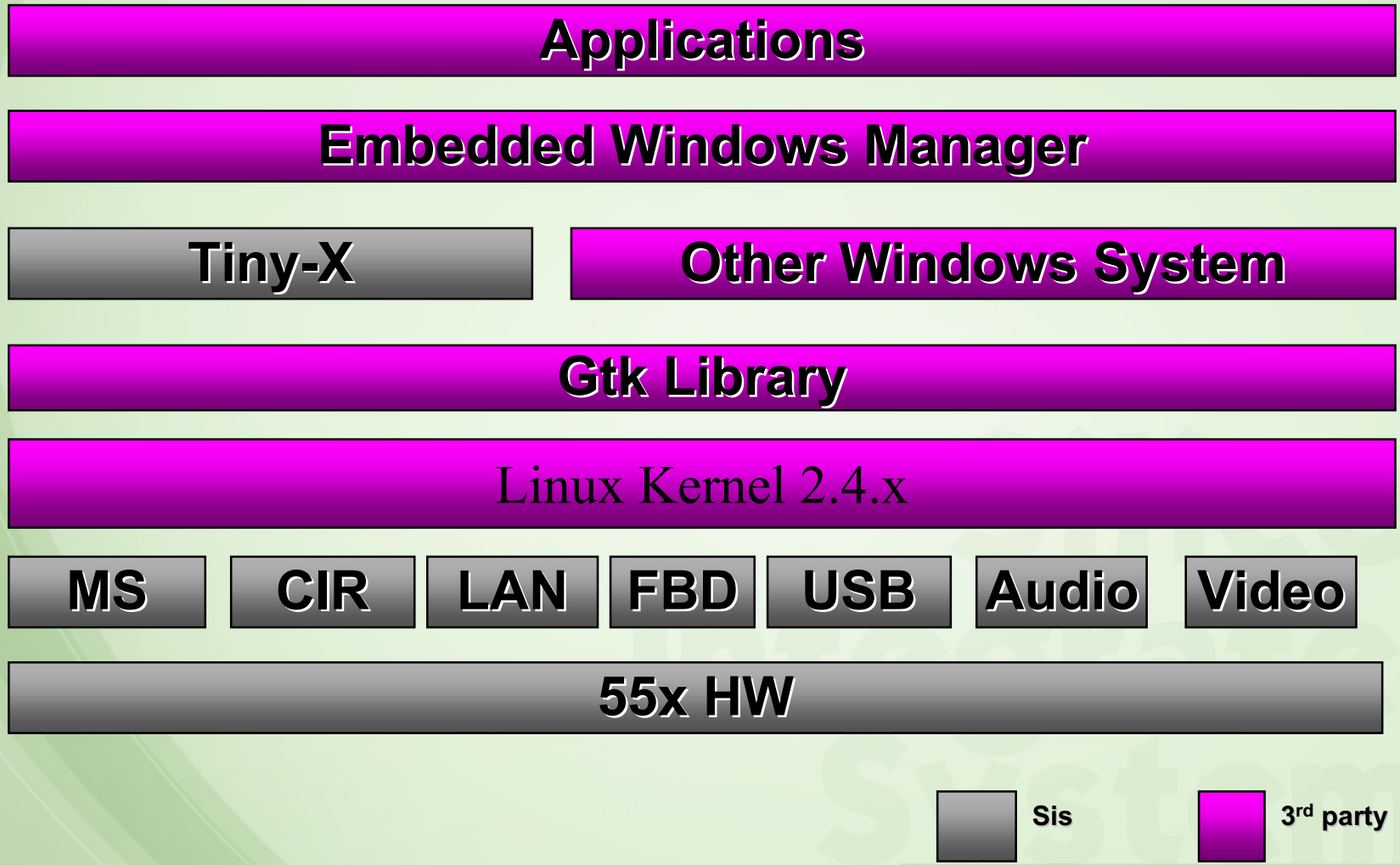
Email

File attachment, Address Book, Multi User, Mail Management

File Management

File transfer between various storage devices

Linux Architecture



WinCE Solution

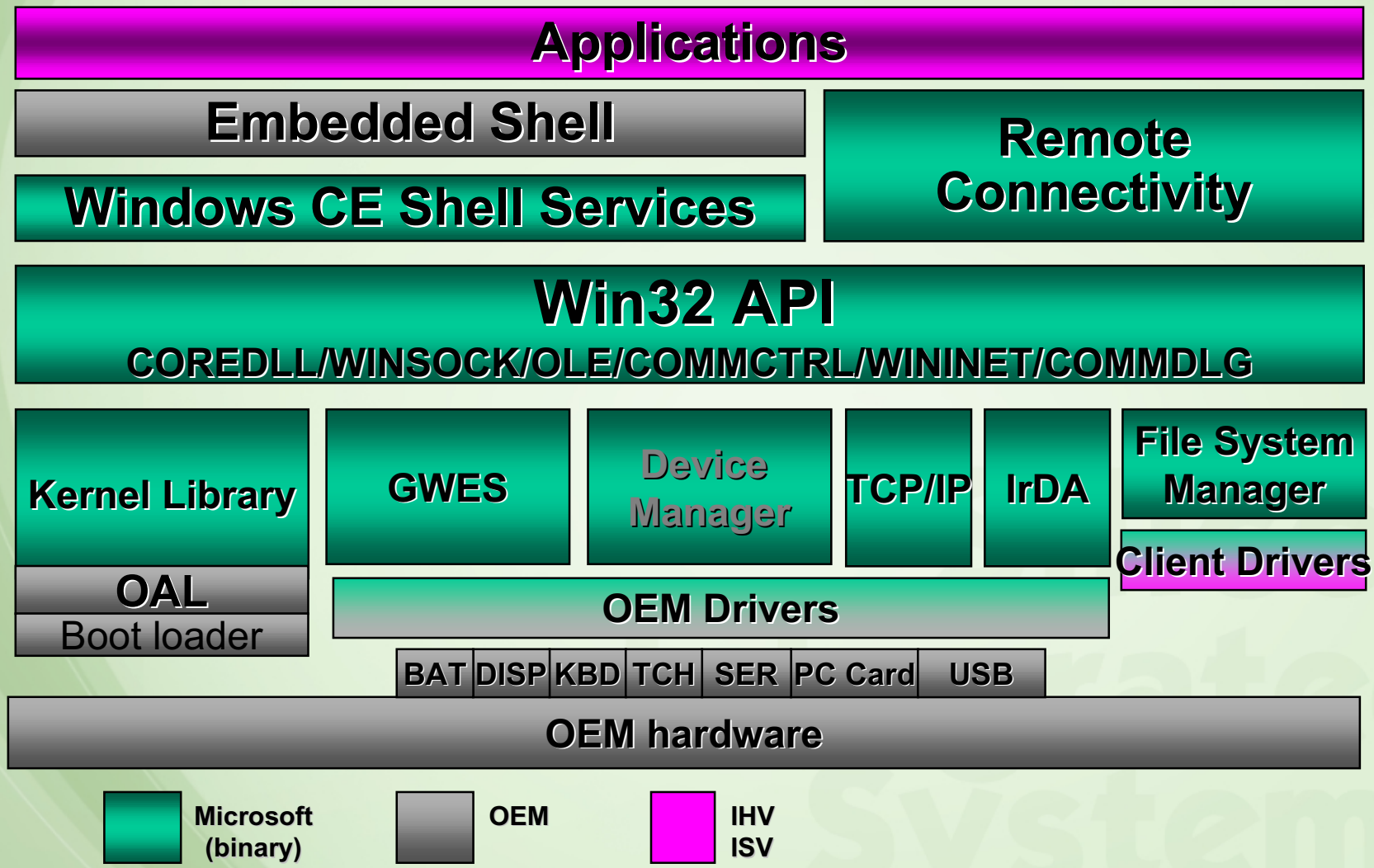
SiS WinCE Package Features:

-Support WinCE 3.0, WinCE.net, WinCE.net 4.1
-Support CE bootloader
-Provide BSP to reduce customers' developing time
-Support 2D, Direct Draw, Direct Sound, Capture

-SW/HW accelerated DVD player (IVI provided)
-Web Browser, Email, Word
-Featuring SiS WinCE on DOM, DOC

-System Integrator of Microsoft
-Microsoft Windows Embedded Partner

WinCE.NET Architecture



Comparison
SIS550 VS NS GX1

	SiS SOC 550 200MHz	NS GX1 200MHz
CPUMark99	7.18 (135%)	5.82 (100%)
Sandra 2001 CPU Dhrystone	396 MIPS (175%)	226 MIPS (100%)
Sandra 2001 FPU Whetstone	206 MFLOPS (159%)	129 MFLOPS (100%)
Sandra 2001 Integer MMX	556 it/S (187%)	297 it/S (100%)
Sandra 2001 FPU MMX	159 it/S (289%)	55 it/S (100%)
Wintune CPU Integer	455 MIPS (162%)	281 MIPS (100%)
Wintune CPU Floating Point	198 MFLOPS (153%)	126 MFLOPS (100%)

Comparison
SiS550 VS SiS552LV VS GX1

	SiS 550 200MHz	SiS 552 LV 266MHz	NS GX1 300MHz
UnixBench 4.1 final score	35.9(100%)	46.9(131%)	35.8(100%)
Nbench 2.1(compiler:gcc2.7.2.3) memory index	**0.81(145%)**	**1.04(186%)**	**0.557(100%)**
Nbench 2.1(compiler:gcc2.7.2.3) integer index	**0.897(128%)**	**1.185(170%)**	**0.697(100%)**
Nbench 2.1(compiler:gcc2.7.2.3) floating-poing index	**0.901(146%)**	**1.159(187%)**	**0.617(100%)**

Test condition:
(1)SiS SOC 550 CPU 200MHz SDRAM 133MHz
(2)SiS SOC 550LV CPU 266MHz SDRAM 133MHz
(3)NS GX1 CPU 300MHz SDRAM 75MHz (up to 75MHz)

OS : Linux 2.4.18
VGA : 800*600 High Color (16 bits)
share memory :4MB

Comparison
SIS550 VS Geode™

	SiS 550 200MHz	NS SC1200 266MHz	NS GX1 300MHz
Maths-Mark	16.7 (145%)	12.0 (104%)	11.5 (100%)
Graphics 2D-Bitmaps	**28.6 (493%)**	**6.8 (117%)**	**5.8 (100%)**
2D Graphics mark	**51.9 (251%)**	**19.8 (96%)**	**20.6 (100%)**
MMX- Mark	**23.5 (284%)**	**10.4 (116%)**	**8.9 (100%)**
Memory Mark	18.5 (111%)	13.5 (80%)	16.7 (100%)
3D Graphics Mark	4.1 (107%)	3.6 (94%)	3.8 (100%)
PassMark Rating	20.0 (125%)	12.4 (77%)	15.9 (100%)

Design FAQ#1

Q: Is SiS55x performance enough for multimedia application at 200MHz?

A: The SiS55x CPU core has three integer and MMX pipelines to improve performance. SiS552 further includes a H/W DVD Accelerator (slice layer and IDCT); it can play DVD titles smoothly at 200MHz.

Q:Does SiS55x include Alpha blending for PIP?

A: SiS55x supports 1 Alpha blending picture with video overlay for OSD or scale video overlay for PIP function: One picture is graphic, and the other is video overlay on TV, CRT or LCD. This function doesn't reduce CPU performance.

Q: What is the VIP input format of SiS552?

A: It is 8-bit ITU-656 video format. It doesn't support 16-bit ITU-601. Note: please remove TW98 TV decoder first before using feature connector for signal input.

Design FAQ#2

Q: What resolutions are supported by SiS55x?

A: In CRT-1 up to 1920*1440 256 color 75Hz NI. In TV up to 1024*768 for graphic mode, 720*480 for NTSC mode, 720*576 for PAL mode. In DSTN panel up to 1024*768 65MHz. In TFT panel up to 1280*1024 110MHz. (SiS301 chip required for TV out; a transmitter required for LVDS panel)

Q:What kind of 2D accelerator is in SiS 55x?

A: SiS 55X built-in an 1T pipelined 128-bit BITBLT graphics engine. It is the same as the SiS315 2D graphic engine.

Q: Which LCD panels are supported by SiS55x?

A: SiS55x supports DSTN and TTL TFT LCD panel. SiS provides special VGA BIOS for each panel type. Before choosing an LCD panel, please read the panel list document first. If you need an LVDS LCD panel, please add an LVDS transmitter.

Design FAQ#3

Q: Does SiS provide LCD utility for tuning screen position?

A: Yes. SiS provides an LCD utility for customers to tune the LCD position for certain makes of LCD panels whose screen position tend to shift. Notice that if you cannot use the LCD VGA BIOS to drive your panel, your panel probably has not been used with SiS 55X SOC. Please contact SiS for support in this case.

Q:Why can I not play DVD title smoothly using SiS552?

A: Please check the following first:

- CPU running at 200 (100*2) MHz
- SDRAM at 133MHz
- DVD ROM DMA function enable
- VGA share memory 16MB
- Win98: using WinDVD V2.1 or PowerDVD (hwplay.exe)
- DVD performance under different OSes: WinCE > Win98 > Linux

Design FAQ#4

Q: Does SiS55x ISA ROM bus support ISA device?

A: No, SiS55x ISA ROM bus (8 bits) is for flash ROM or DOC only. You cannot connect an ISA device to this bus. Due to H/W address decoding, BIOS code mapping and DOC driver limitation, you cannot put flash ROM for BIOS and DOC for C: disk in this bus simultaneously.

Q: Does SiS55x support ISA bus?

A: SiS55x doesn't support ISA bus. If an ISA bus is needed, please use an LPC to ISA bridge. Also, SiS55x dones't support ISA master mode.

Q:What is the smart card controller spec?

A: Compliant to ISO7816 protocol and PC/SC Working Group standard, except that it doesn't support the commands exceeding 64 bytes.

Design FAQ#5

Q: What type of AC'97 audio controller is in SiS55x?

A: SiS55x offers an AC'97 compliant interface that comprises digital audio engine with a hardware DirectSound™ accelerator, on-chip sample rate converter, and professional wave-table along with a separate modem DMA controller.

Q: What is the power consumption of SiS 55x?

A: SiS55X is a fan free SoC. When running at 200MHz (Vcore 1.9V), the max power is 3.85W. When waiting for keyboard or mouse events in Win98 (ACPI S0 state), the CPU utilization is kept at 0%. In this idle mode, power is 2.53W. In 2003, SiS plans to introduce the next generation SiS55x, named SiS 550/2 LV. When running at 200MHz, the power is under 2W (full running). SiS552LV is target to run at 250MHz; it consumes 3.5W (max) at this clock rate.