Building Instantly Available Systems with Intel's IAPC Test Matrix

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Agenda

- Why do IAPC?
- Overview of IAPC Testing Procedures
- IAPC Test Matrix – Hands on Testing
  - Software (Integration & Testing)
- Summary

IAPC Mission statement

- Instantly Available is an Intel technology initiative enabling PC manufacturers to:
  - Advance platform capabilities while still comprehending the increasing importance of global regulatory compliance
  - Design platforms that improve ease of use and enable new uses for the PC
  - Reduce PC TCO

Changing Landscape

- New user requirements
  - Connected “vision”
  - Ease of Use
- WW Energy Regulations
  - Energy Star*
- PC 2001 System Design Guide
  - IAPC/S3 is a requirement for WHQL

IAPC = Microsoft Windows Logo

Regulatory Environment

- Regulatory Requirements are changing
- Outcome of the Kyoto summit driving global regulatory harmonization
- EPA Energy Star MOU is finalized and signed
  - New requirements
    - July 1, 1999 30watts with communications capability
    - July 1, 2000 15watts with communications capability
  - Energy Star logo:
    - Required for many Federal, State and local purchases
    - Consumer recognition
- Energy Star fast becoming the de-facto standard
  - EU has adopted the standard
  - International Energy Star covers Japan, New Zealand, Canada and Sweden

IAPC ensures Regulatory compliance

Sleep States

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State	Power level	Resume time	Fans in sleep state	Event Wake up?	Cost
APM	~30W High	~2-∞ sec	On	No	None
S1	~30W High	~2-5 sec	On	Yes	None
S3 (Suspend to RAM)	<5W ✓	~10sec ✓	Off ✓	Yes ✓	$.75-1.00 FETs on MB
S4 (Suspend to disk)	<5W	30-60s Slow	Off	Yes/No (cost)	None if no wake

S3 is best blend of acoustics, power savings, communications & cost

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Industry Status

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- 12+ OEMs shipping IAPC systems today
  - Acer, Compaq DeskPro* EN series, Daewoo NeTeen*, Luxor* and Argo*, Dell GX-150, Dimension™ 8100, Precision 330, FIC Sahara 3810, HP, IBM, Legend Cornet* 8000/6000/2000, Mitac, NEC Simplem*, Siemens SCENIC* 600 and SCENIC* 800, Samsung M6200*
  - Multiple designs in the pipeline
- IHV's in every category shipping supporting product today
- OS's available to support user requirements

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Why do IAPC?

Broad Industry IAPC Support

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VIDEO/GRAPHICS SOLUTIONS

Riva TnT2 V3800
3Dfx Banshee 16MB AGP
3Dfx Voodoo3 2500 16MB AGP
3Dfx Voodoo3 3000 16MB AGP
AGP,Nvidiatnt,NV4,16MB
AGP,Nvidiatnt,NV4,16MB
ATI Rage Fury 32MB, AGP
ATI Rage Pro AGP, 8MB
ATI Rage Pro LT AGP, 8MB
Creative Blaster RivaTNT 16MB AGP
Creative Blaster RivaTNT2 32MB AGP
Creative Blaster RivaTNT2 Ultra 32MB AGP
Creative Annihilator
Diamond Viper 770 AGP, 32MB
Diamond ViperAGP,v770D,32MB,ULTRA
Guillemot MAXI Gamer
Guillemot Prophet
Matrox G200
Matrox G400
MR2X_F300,AGP,3DF,3000D,16MB
Number 9 Savage 4 AGP 16MB
Nvidia TNT AGP 16MB
Nvidia TNT2 AGP 32MB
Nvidia Ge-Force
S3 Savage 3 AGP
S3 Savage 4 AGP
Savage 4 32MB AGP
SIS 400
STB Volicity 4400 AGP 16MB
TNT 2 AGP 32MB Ultra
Vanta 16 (TNT)

AUDIO SOUND SOLUTIONS

ADI SoundMAX Audio PCI
AUREAL 8820 A3D, PCI Vortex 1
AUREAL 8830 A3D,PCI Vortex 2
Creative ENSONIQ 1371
ESS Canyon 3D
ESS Allegro
ESS Maestro
Yamaha YFM724
Turtle Beach Montego 1
Turtle Beach Montego 2
Diamond MX300

NETWORK SOLUTIONS

NIC,3C905B-TX-PXE w/H-001,10/100MB
Intel Pro10/100, 559
Madge Smart 16/4 PCI MK3
Olicom OC3139

ANALOG MODEM SOLUTIONS

3Com Winmodem PCI, 56K,V.90
Lucent MARS 1646 PCI
PC-TEL HSP 56, 56k, V.90
Motorola MC142455RDK PCI 56k V.90
SM56 PCI Soft Modem
Conexant RC56HCF-PCI 56K V.90

Motherboards

P3B-F
MEW
370SWM
370SWD
WinneX 1
WinneX 2
WinneX 3
WinneX 5
D-1107
GA-BX2000
MX3W
MX3W-L
CA810
S381-M+
PW35-S (Slot1)
PW65-S (Slot1)
PW35-D (Slot1)
PW65-D (Slot1)
PW35-E (Slot1)
PW65-E (Slot1)
PW65-L (Slot1)
CW35-S (Socket 370)
CW65-S (Socket 370)
CW65-D (Socket 370)
CW35-D (Socket 370)
CW35-E (Socket 370)
CW65-E (Socket 370)
MSI-6178
MSI-6182
MSI-6163 PRO
SY-6IWA (Slot1)
WX6

BIOS

Phoenix ACPI S1,S3, and S4 capable BIOS
AMI ACPI S1,S3, and S4 capable BIOS

Chipsets

Intel® 810
Intel® 810E
Intel® 820
Intel® 815
Intel® 850

Components Available NOW!

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IAPC Platform Testing

- BIOS test
- System idle S1/S3 sleep/resume
- Functionality with reference peripherals, S1/S3 sleep/resume
  - PCI, USB, CNR
- System running Audio/ Video stream. S1/S3 sleep resume.
  - Games, AVI files, DVD

PCI-PM (D3) Functional Test: Graphics Subsystem

- Suspend/Resume with DirectX® Samples.
  - Play DirectX® Sample.
  - Suspend/resume to (S0->S3->S0).
  - Verify proper card functionality.
    - Dialog box prompt “Do you see…”
- Suspend/Resume under real use conditions.
  - Launch Reference Application (Game)
  - Suspend/resume to (S0->S3->S0).
  - Verify proper card functionality.
    - Video returns with no corruption.

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PCI-PM (D3) Functional Test: Audio Subsystem

- Suspend/Resume with DirectX® Samples.
  - Play DirectX® Sound Sample.
  - Suspend/resume (S0->S3->S0).
  - Verify proper card functionality.
    - Dialog box prompt “Do you hear…”
- Suspend/Resume under real use conditions.
  - Launch Reference Application
  - Suspend/resume to (S0->S3->S0).
  - Verify proper card functionality.
    - No sound corruption noted. Full functionality restored.

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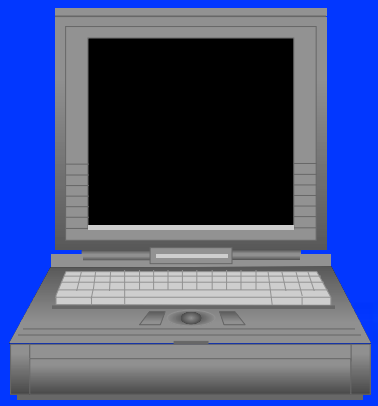
PCI-PM (D3) Functional Test: Modem Test

- Wake-on-Ring from D3 cold
  - Run modem diagnostic to ensure proper functionality
  - Suspend target machine
  - Call target from master.
  - Verify wake-up of target
  - Run modem diagnostic to ensure proper functionality following resume

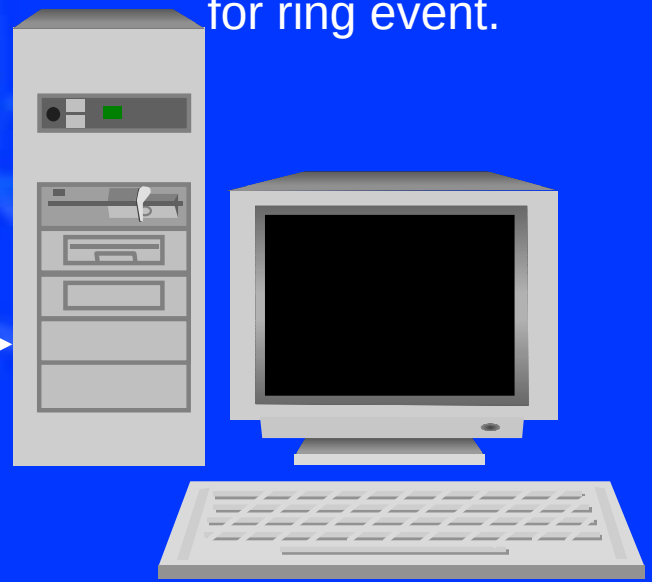
Subsystem Testing: Modem



Phone Line

TLS

Phone Line



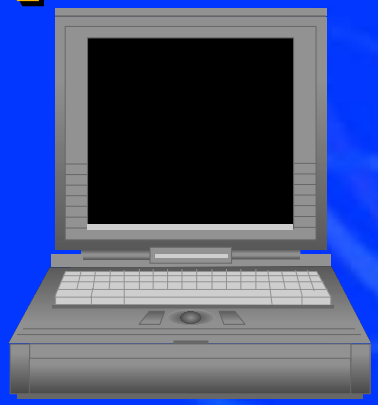
Test PC with Modem Installed: In sleep state waiting for ring event.

Laptop:
Generation of ring via HyperTerminal

PCI-PM (D3) Functional Test: LAN Test

- Wake-on-LAN from D3 cold
  - Run PCIPMTEST.exe to ensure that the proper registers are implemented according to PCI PM 1.1 spec.
  - Ping target card to ensure proper functionality
  - Suspend target machine
  - Send IP packet to target from master.
  - Verify wake-up of target
  - Ping target card to ensure proper functionality following resume

Subsystem Testing: LAN



Laptop:
Generation of wake event via ping/drive access.

Ethernet Crossover Cable

Test PC with NIC Installed: In sleep state waiting for wake event.

USB & CNR Testing

- System S1/S3 suspend resume with USB keyboard/mouse
- USB LAN/modem testing similar to PCI LAN/modem testing with PCI D3 test software
- CNR devices can be tested with PCI D3 test software

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IAPC test matrix

IAPC Subsystem	Test Tool	Comments/Behavior
BIOS	WHQL	ACPI compliance
Power measurements while in sleep state	Manual/power meter	Less than 15W, ~5W recommended
Resume time measurements	Manual/stop watch	<=10 sec
Dual mode power delivery circuits: - Memory VCC - PCI Vaux - USB VCC measurements	Manual Volt meter / PCI Fox Fire 2 card	3.3V PCI Vaux, USB 5V and memory voltages within regulation while in sleep and during wakeup
LEDs	Manual	Power LED changes color while in sleep. OFF in S4/S5.

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IAPC test matrix

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IAPC Subsystem	Test Tool	Comments/Behavior
RTC wake	Suspender WHQL PCI-D3 tests	Proper wakeup after scheduled event.
Graphics/ Audio	WHQL/PCI-D3 tests	Graphics/Audio/system functionality after wakeup
Modem/LAN	WHQL/PCI-D3 tests	System functionality, PCI wakeup, Vaux connections
USB device	Manual	System functionality, USB wakeup, Vaux connections
HD/CDROM/DVD	Manual	System functionality, ensure that device is in the same DMA/PIO mode and that timing is the same
Parallel/Serial port devices	Manual	System/device functionality after wakeup

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IAPC test matrix

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Extended Stability Test		
- 1000 suspend/resume cycles	Suspender	System stability using RTC wake
- 150 power button cycles	Power switch simulator	System stability using power button
- Modem/LAN multiple wakeups	Waker/Dozer	System stability using PCI wake mechanism

Notes:

- Tests should be repeated for all supported sleep states (S1, S3, S4)
- HD/CD/DVD devices should be set to DMA mode

Ensure that tests are passing for the fully integrated system

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IAPC Software Testing

- Fully configured systems (HW + SW) should be tested for IAPC compliance – run stress tests
- Ensure that all the peripherals and their drivers properly suspend and resume (IHVs)
  - Suspend /resume stress cycles
  - Ensure that cumulative memory leaks are identified and resolved
- Applications should properly support power management (ISVs)
  - Suspend /resume stress cycles
  - Ensure that cumulative memory leaks are identified and resolved

Other opportunities to test

- WHQL tests all peripherals for D3 support
  - Devices lose power in D3
  - Part of latest HCT
- New platform workshops
  - Opportunities to test both platforms and peripherals
  - US, Europe and Asia.
- USB plug fests
  - Ensures systems with USB devices suspends and resumes properly
  - Tests for wakeup capabilities
  - Visit USB web page for plug fest schedule

Passing peripherals and systems will be added to IAPC WEB page

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Summary

- IAPC ensures Regulatory Compliance
- Systems & Components are ready
- Utilize IAPC Test Matrix
- Continue learning from each other

Call to Action

- ALL: Test Systems & Peripherals for S3
- OEMs: Drive applications and peripherals vendors to properly implement power management features
- IHVs, ISVs: Run stress tests on IAPC platforms to ensure robust power management implementation in drivers and applications

Information Sources

- **Instantly Available PC website**
  http://developer.intel.com/technology/iapc
- **Instantly Available PC System Power Delivery Specification**
  http://developer.intel.com/design/power/supply98.htm
- **Instantly Available PC Design Guide**
  http://developer.intel.com/design/power/pcpower.htm
- **Instantly Available PC integration Guide**
  http://developer.intel.com/technology/iapc/Instantly_Available.pdf
- **Supporting Instantly Available PC components**
  http://developer.intel.com/technology/iapc/involve
- **PCI-PM 1.1 Specification**
  http://developer.intel.com/technology/iapc/downloads/pm1_1.htm
- **PCI-PM 3.3Vaux ECR**
  ftp://download.intel.com/design/power/vauxecr.pdf
- **ACPI 2.0 Overview and Specification**
  http://www.teleport.com/~acpi/spec.htm
- **PC 2001 System Design Guide**
  http://www.pcdesguide.com/PC2001/default.htm
- **ENERGY STAR* MOU**
  http://www.epa.gov/appdstar/esoe/pdf/comp_mou_fd.pdf


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