

# **Manageability HW Sensors and Controls**

**Intel Corporation  
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# Role of HW Sensor in Manageability

- Provide data on HW conditions
- Provide data on HW inventory
- Provide data on SW conditions
- Provide data on SW inventory
- Proactively warn of impending problems

# Types of Sensors

- **Cooling**
  - ◆ Temperature probe
  - ◆ Fan rotation
- **Power**
  - ◆ Power supply approaching failure
- **Chassis**
  - ◆ Intrusion detection
- **Equipment status**
  - ◆ LAN leash (detect missing or inoperative systems)

# How Sensors tie to Mgmt App

- discussion of busses and data flow
- instrumentation (sensors and controls)
- alerts
- service provider
- mgmt apps

# Platform Considerations

- How sensors are wired in HW (light on platform specifics (present the concepts))

# Commonly Used Sensors

- Typical sensors (light on platform specifics)
- LM75\*
- LM78\*
- LM79\*
- AD8001
- Magic Packet\*
- Alert Pack

# Platform Sensors

The following information is routed to the platform management subsystem, and corresponding events logged in the event logs on each class of systems:

	<u>Servers</u>	<u>Desktop</u>	<u>Mobile</u>
● <u>Voltage/Analog Sensors:</u>			
◆ +12V, +5V, -5V, +3.3V, -12V	Y	Y	Y
◆ CPU Voltage (per CPU)	Y	Y	Y
◆ Chipset logic voltage	Y	Y	Y
◆ SCSI Termination voltage	Y	N	N
● <u>Temperature Sensors:</u>			
◆ Baseboard Chipset Area	Y	Y	Y
◆ I/O area	Y	NA	NA
◆ RAID Backplane	Y	NA	NA
◆ CPU (per CPU)	Y	Y	Y
● <u>Fans:</u>			
◆ Fan RPM (tach) low speed	Y	Y	Y
● <u>Chassis:</u>			
◆ Chassis Intrusion	Y	Y	Y
◆ Electrical Interlock Status	Y	Y	Y

# Platform Sensors

	<u>Servers</u>	<u>Desktop</u>	<u>Mobile</u>
<u>ECC Memory:</u>			
◆ SIMM/DIMM count/pres.	Y	Y	Y
◆ DIMM module size	Y	Y	Y
◆ Single bit	Y	Y	Y
◆ Double bit ECC errors	Y	Y	Y
● <u>Bus Errors:</u>			
◆ PCI - PERR	Y	Y	Y
◆ PCI - SERR	Y	Y	Y
◆ EISA/ISA NMIs	Y	Y	Y
● <u>Processor Monitoring:</u>			
◆ IERR (Internal Error)	Y	Y	Y
◆ Thermal Trip	Y	Y	Y
◆ Machine Check Exception	Y	Y	Y
◆ Processor Presence	Y	Y	Y
◆ CPU voltage ID @ CPU	Y	Y	Y
◆ BIST Failure	Y	Y	Y



# Platform Sensors

	<u>Servers</u>	<u>Desktop</u>	<u>Mobile</u>
● <u>Power Supply</u>			
◆ Power Supply Fan RPM	Y	Y	Y
● <u>Redundant power supplies</u>			
◆ Power Supply Presence	Y	N	N
◆ Power Supply Fault	Y	N	N
◆ Fault Resilient Booting	Y	N	N
◆ Current Overload	Y	N	N
◆ Redundancy State	Y	N	N
● <u>Hot-swap Drive Backplane</u>			
◆ Drive Presence	Y	N	N
◆ Drive array status	Y	N	N
◆ Drive Power Status	Y	N	N
● <u>Disk Drive</u>			
◆ S.M.A.R.T.	Y	S	N

SMART indicates predictive failure from IDE and SCSI disk drives

Drive Array Status (Fault, Rebuilding, Identify, etc. - extracted from information set to backplane via SCSI)

# Trends/Recommendations

- **Sensor interfaces will evolve**
  - ◆ **Abstract via SW as much as possible**
- **Sensor populations and types of sensors will increase**
  - ◆ **Plan for extensibility**
- **Hot plug becomes more important (ACPI, SMBIOS, USB, 1394)**
  - ◆ **Build self-descriptive platforms and dynamically-configurable SW**