SHB Express™ (PICMG 1.3) Frequently Asked Questions

Q: Why call the specification SHB Express and not SBC Express?
A: SHB means System Host Board and the technical subcommittee felt that SHB provided a good way to avoid confusion with PICMG 1.0 and PICMG 1.2 SBCs that support the PCI/ISA or PCI-X/PCI interface. Essentially an SHB performs the same function as an SBC. We use the term SHB Express to define a system host board that uses PCI Express as the primary interface to the backplane. The terms "SHB Express" and "PICMG 1.3" can be used interchangeably.

Q: Must a PICMG 1.3 SHB connect to a PICMG 1.3 compatible backplane?
A: Yes.

Q: Does the SHB Express specification provide support for future Advanced Switching products?
A: Yes, provisions have been worked into the specification that allow the SHBs and PICMG 1.3 backplanes to support not only Advanced Switching but also PCI Express Gen 1 and Gen 2 hardware.

Q: Will all SHBs exhibit the same PCI Express performance in all PICMG 1.3 backplanes?
A: It depends; the data throughput performance between the SHB and PICMG 1.3 backplanes should be fairly uniform across various SHB and backplane combinations. The specification calls for the use of PCI Express configuration straps to be used between PCI Express slots on the PICMG 1.3 backplane and the edge connector A on the SHB. These configuration straps inform the SHB what PCI Express link is expected on a specific PCI Express option card slot on the backplane. The SHB uses this information to enable the PCI Express link training/auto-negotiation process. Auto-negotiation establishes an acceptable PCI Express link configuration and connection between the SHB and the backplane slot provided there are enough PCI Express links available at the SHB. It's possible that a PCI Express link could be established at a lower link speed than one might expect due to the specific chipset used on an SHB. For example a PCI Express option card may have a x16 PCI Express link and the SHB may establish the connection to that option card slot using a x8 PCI Express link. In most of today's applications this scenario will still result in acceptable system performance.

Q: Will all SHBs support all of the available PCI Express option card slots on a PICMG 1.3 backplanes?
A: It depends; the SHB Express specification provides a lot of design flexibility on how the PCI Express link configurations can be routed to the PICMG 1.3 backplanes. This flexibility could result in a particular vendor's SHB not having enough available PCI Express links and reference clocks to drive all of the available PCI Express slots on a specific PICMG 1.3 backplane. The specification is designed to prevent any system damage should this functionality mismatch occur. If this mismatch occurs then the affected PCI Express slot on the backplane will simply not function. Some SHB vendors may define classes of SHBs and PICMG 1.3 backplanes as: Server Class or Graphics Class. Server class SHBs typically have one x4 and two x8 PCI Express links routed to edge connectors A & B and Graphics class SHBs generally provide one x16 and a number of x1 PCI Express links. Some chipsets allow four x1 links to be combined into one x4 link and there may be other acceptable combinations as PCI Express chipsets continue to evolve. The bottom line is that the SHB must have enough available PCI Express links and reference clocks routed to the backplane to support all the available PCI Express option card slots.

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Q: Can a PCI Express serial communication link support multiple PCI Express card slots like a PCI or PCI-X parallel bus?
A: PCI Express is a point-to-point, high speed and scalable bandwidth serial communication interface. The chipsets support multiple PCI Express links that can be routed to a PICMG 1.3 backplane to support a number of PCI Express option card slots. A PCI Express link cannot be made to support multiple PCI Express card slots directly; however, PCI Express fan-out switches are available from a few vendors. A PCI Express fan out switch takes an incoming PCI Express link and produces multiple PCI Express links. The basic function of a fan out switch is a similar to a bridge chip in that the fan out switch can provide support for multiple PCI Express option card slots. The third generation of PCI Express called Advanced Switching (due out in late 2005) takes the fan-out switch concept to a higher level by adding more switching and routing options in what essentially becomes a PCI Express fabric mesh architecture. Even with Advanced Switching additional components will be required to support this fabric mesh capability of the third generation of the PCI Express interface.

Q: Does the SHB Express specification define standard hole patterns for PICMG 1.3 backplanes?
A: Yes. This limitation of the PICMG 1.0 specification was corrected and backplane hole patterns and mechanical dimensions are defined for 13-slot, 20-slot and 2U form factors.

Q: Are soft power control features now supported in the SHB Express specification?
A: Yes. PICMG 1.3 addressed this limitation of the PICMG 1.0 specification. All stand-by voltage signals and soft power control signals as defined by the term ACPI and are supported in the SHB Express specification. The BIOS used on an SHB usually incorporates ACPI software modules to provide the wake and reset functions required in soft power control application.

Q: Does soft power supply control make a difference in cabling and turning the system off/on?
A: Yes. In previous generation PICMG 1.0 backplanes we had the ability to turn the system on and off in a couple of ways:

A. You could turn off the AC to the system.
B. With ATX style power supplies, you could connect a DC power switch to the PSON (power supply on) header on the backplane. This turns on the Power Supply DC outputs.
C. With the soft power control allowed in the PICMG 1.3 specification, there is a third method for turning on the system:
    a. A PICMG 1.3 backplane can have a PWRBT header on the backplane for a “power button”. A momentary switch can be connected to that header to turn a system on after a shutdown, just like with a desktop motherboard.

Method C above requires an ATX style power supply that has soft power control and 5V standby voltage. The standby voltage is used to keep alive the circuitry in the CPU chipset that allows it to wake up from a pushbutton or some other wakeup event.

Q: Can I still use methods A and B described in the previous answer to control the system power?
A: The answer is a qualified yes. Most SHBs will have a setting in the BIOS that determines how the system reacts to AC power interruption. For example this setting may offer three options:

A. Always turn on when AC is applied,
B. Always be off when AC is applied,
C. Return to the last soft on or off state that was present when AC was removed.

AC power control will always allow you to turn off the system. However, in order to have the system come on as soon as AC is applied, the BIOS must be configured to operate in that fashion. Of course, remember that most operating systems will want you do orderly shutdowns before removing AC power.

While controlling the system power using the second method B can be done as described in the previous question's answer; it is not the recommended in this type of system. The PSON signal is used to turn on the outputs of an ATX type power supply. However, the CPU boards' chipset has its own preserved power on/power off state knowledge. If the CPU believes it should be off, and the PSON signal is asserted, you can get into the interesting situation where all of the power is on, but the CPU isn't operating. The CPU is waiting for the use of the momentary power button as outlined in power-on method C in the previous answer. How confusing is it to have all of the power LEDs on the backplane indicate that the system is alive, but there is no video?

Q: What is the purpose of the 5V AUX jumper on PICMG 1.3 backplanes?
A: The PICMG 1.3 specification requires that voltage be applied to the SHB 5V standby (or auxiliary) pins. If a power supply does not provide 5V AUX, the CPU will not properly power on. Normally this 5VAUX jumper is used to route 5V AUX to the CPU board. For power supplies without 5V AUX, this jumper routes regular 5V to the SHB's 5V AUX pins.

Q: Can the SHB be inserted or removed with AC to the power supply still on?
A: No, it should not be removed with AC turned on. Even if the power supply has been turned off by an orderly soft shutdown, the 5V standby voltage will be active until the AC has been turned off or unplugged. This is why there is an LED indicator on the backplanes for 5V AUX.

Q: Is wake on LAN supported by the slots on PICMG 1.3 backplanes?
A: Yes, it is allowed in the PICMG 1.3 specification. There will be power supply limitations on how many slots could support devices that wake the CPU from sleep states. The limitation stems from the relatively low current available on the 5V AUX rail from the power supply.