

Subject: : AmigaOS4

Topic: : pci-e/m.2 ssd on x5000?

Re: pci-e/m.2 ssd on x5000?

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The reason is obvious. The P5020 is targeting embedded network solutions and not generic PC solutions. So the lanes can be configured for a combination of PCIe, SRIO, XAUI, SGMII and SATA interfaces with network applications in mind. You cannot freely assign these interfaces to any serdes lane. You can only choose from 28 different serdes lane/interface configurations.

Table 3-15 in the P5020 reference manual shows the different configurations for the 18 serdes lanes.

When you want to use two SATA controllers then there are only 18 configurations left.

The optimum configuration for PC applications would be SRDS\_PRTCL=0x02. This serdes configuration offers:

-PCIe1 2.0 x4

-PCIe2 2.0 x4

-PCIe3 2.0 x1

-PCIe4 2.0 x1

-SATA1 2.0

-SATA2 2.0

This is a maximum of 12 out of 18 lanes. (There is also a x8 configuration available but this one is limited to PCIe gen1 speeds. So no improvement in bandwidth at the expense of the x4 slot.)

From design perspective, the X5000 needs 14 lanes. 12 PCIe + 2 SATA. So they needed an external PCIe switch anyways to gain the additional lanes.

From performance perspective, it would have been nice that they routed the two unused PCIe lanes to 2 of the PCIe x1 slots directly. But since x1 slots are used for audio cards and ethernet cards, this is no loss. Personally, I wouldn't mind to lose 2 PCIe x1 slots or 1 x1 slot and the two PCI slots. This would have saved the costs of the PCIe switch. But this is now the ultimate P5020 solution for an ATX form factor.

The T2080 has similar limitations. The best configuration for this processor is:

-PCIe4 3.0 x4

-PCIe1 2.0 x4

-PCIe2 2.0 x2

-PCIe3 2.0 x2

-SATA1 2.0

-SATA2 2.0

This is 14 out of 16 lanes. PCIe4 supports gen3. This doubles the bandwidth compared to the P5020. But graphics chips, or at least the ones that we can use, barely benefit from higher bandwidth.

Tomshardware did a nice test about this in: "The Myths Of Graphics Card Performance: Debunked, Part 2". In this article, they compared the framerate of the Radeon R9 290x with benchmark software for PCIe 3.0 x16 (15.75GB/s) all the way down to PCIe 1.0 x8 (2GB/s ; same bandwidth as the X5000). The result was 59.6fps versus 56fps. So almost 8 times more bandwidth resulted in only 6.4% more fps.

The two remaining serdes lanes of the T2080 can be used for SGMII. It might be beneficial to the board layout to use the SGMII interface instead of the RGMII interface.