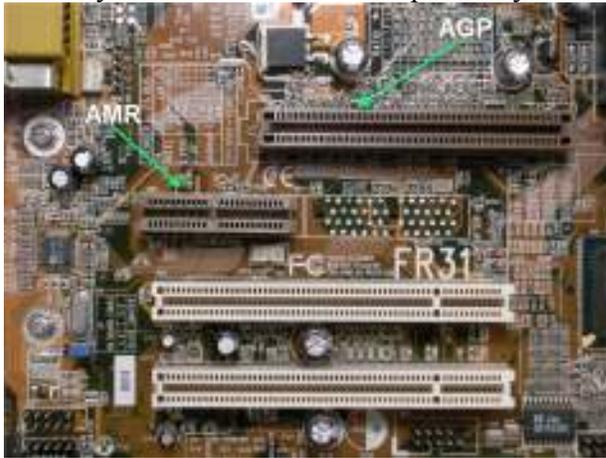


AGP: Accelerated Graphics Port was developed for the use of 3D accelerated video cards and alleviated the disadvantages of PCI for video. Originally designed as a 32-bit 66 MHz bus (known as 1x), it had a maximum data transfer rate of 266 MB/s. Additional versions were delivered, for example, 2x, with a data rate of 533 MB/s, effectively doubling the fastest PCI output. (To do this the 66 MHz bus was double-pumped to an effective 133 MHz.) Two more versions included 4x (quad-pumped) offering 1 GB/s, and 8x with a maximum data rate of 2 GB/s. The AGP bus connects directly to the northbridge, addressing one of the limitations of PCI. Although there is some compatibility between cards, different slots (1x, 4x, and 8x) use different voltages. You should verify that the AGP card is compatible with the stated voltage in the motherboard documentation. An example of an AGP slot is shown in the figure below. AGP has been virtually eliminated in new computers by PCI Express.



AMR and CNR: Intel's audio/modem riser expansion slot was designed to offer a slot with a small footprint that had the capability to accept sound cards or modems. The idea behind this was to attain Federal Communications Commission (FCC) certification (which is a time-consuming and detailed endeavor) for the adapter card once, instead of having to attain FCC certifications for integrated components on motherboards over and over again with each new motherboard released. This way, the card could be transferred from system to system. The idea was flawed from the start, because adapter cards so quickly progress. This technology, and its successor CNR, are not used in today's motherboards, but you still could see them in use in the field. Figure 2.6 shows an example of AMR. Quite often, expansion buses are labeled on the motherboard just above the slot. You can see the letters "AMR1" just above the AMR slot toward the left in the figure 2.6.

The Communications and Networking Riser (CNR) was Intel's adaptation of AMR and was meant for specialized networking, audio, and modem technologies. It was superior to AMR because it could be software or hardware controlled but had the same result as AMR and has been obsolete since about 2007.

PCMCIA: The Personal Computer Memory Card International Association is actually an organization that develops the PC Card technology used in laptops; it is not an expansion bus, although you might see it referred to that way. PC Cards (originally called PCMCIA

cards) were first designed for additional storage and later for modems, network cards, combo cards, and hard drives. You have probably seen these credit card-sized devices in the past; however, they are superseded by another technology known as ExpressCard.