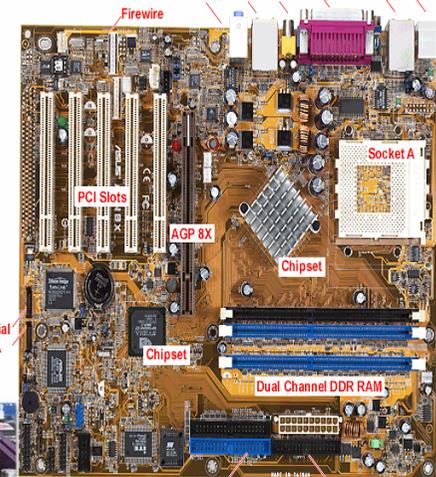


Lesson 2

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System Board Components

- Chipsets
- Expansion slots
- Memory slots and external cache
- CPU and processor slots or sockets
- Power connectors
- Onboard disk drive connectors
- Keyboard connectors
- Peripheral port and connectors
- BIOS chip
- CMOS battery
- Jumpers and DIP switches
- Firmware

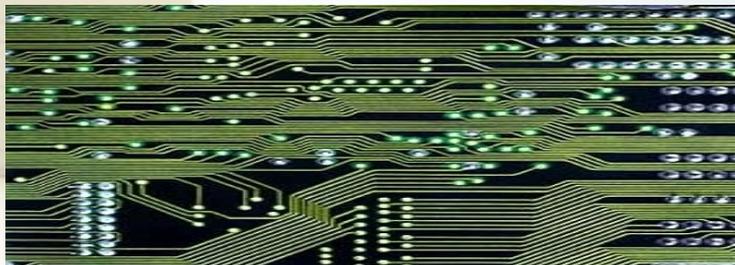


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Introduction to the concept of a bus

A **bus**, in computing, is a set of physical connections (cables, printed circuits, etc.) which can be shared by multiple hardware components in order to communicate with one another.

A **bus** is simply a circuit that connects one part of the motherboard to another



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- A bus is characterized by the amount of information that can be transmitted at once.
- This amount, expressed in **bits**, corresponds to the number of physical lines over which data is sent simultaneously.
- A 32-wire ribbon cable can transmit 32 bits in parallel.
- **"width"** is used to refer to the number of bits that a bus can transmit at once.
- additionally, the bus speed is also defined by its **frequency (expressed in Hertz)**, the number of data packets sent or received per second.
- Each time that data is sent or received is called a **cycle**.

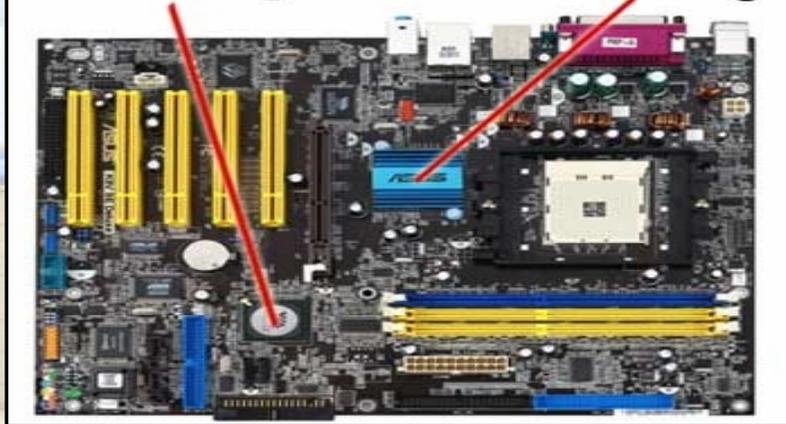
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- maximum transfer speed of the bus, the amount of data which it can transport per unit of time,
- by multiplying its width by its frequency.

Chipsets

- A chipset is a collection of chips or circuits that perform interface and peripheral functions for the processor.
- **“Coprocessor.”**
- Chipsets are usually given a name and model number by the original manufacturer
- in dictating the number, speed, and type of **CPU(s)** and the amount, speed, and type of **RAM** that can be used.
- Intel-based motherboards typically use two chips and the SiS chipsets typically use one.
- integrated circuits designed to perform or control certain tasks.

South Bridge North Bridge



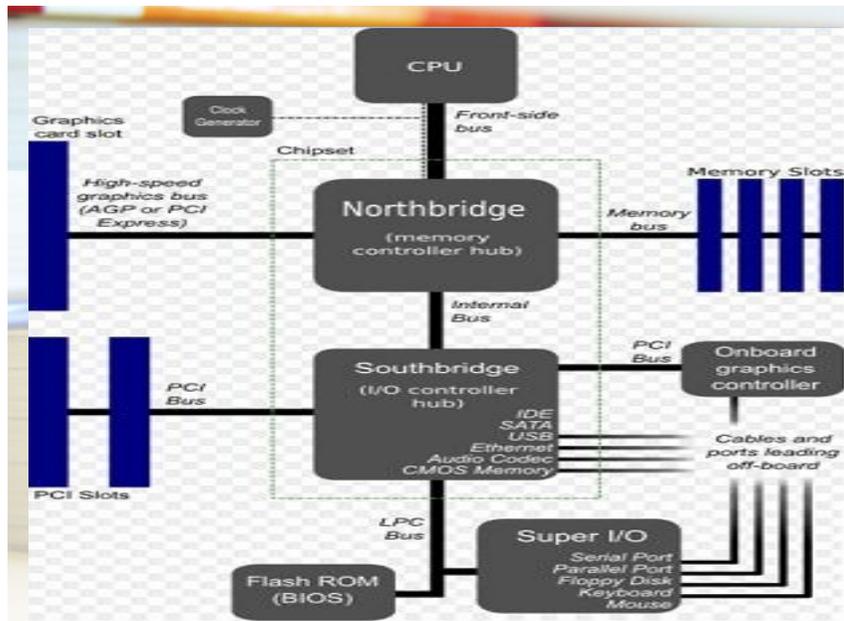
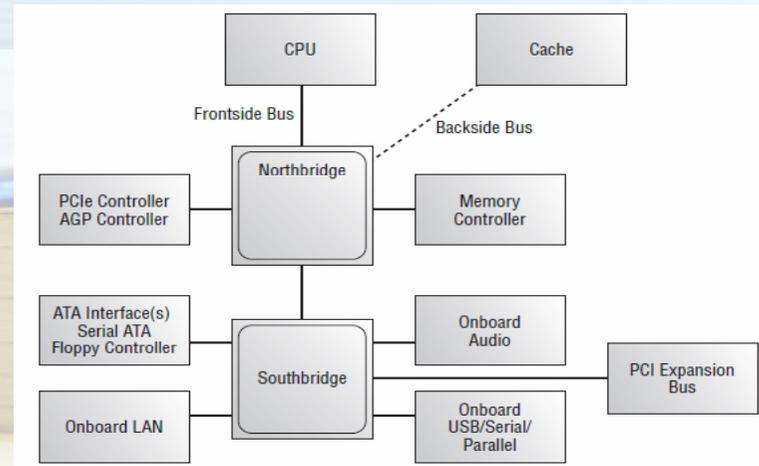
Northbridge Vs Southbridge

The term **bridge** is generally used to designate a component which connects two buses.

- management of high-speed peripheral communications.
- It typically handles communications among the CPU, RAM, AGP, PCI-e
- manage the communications between the Southbridge chipset and the rest of the computer.
- responsible for providing support to the myriad onboard peripherals (PS/2, Parallel, IDE, and so on), managing their communications with the rest of the computer and the resources given to them.
- Most motherboards today have integrated PS/2, USB, Parallel, and SerialLAN, audio, infrared, and FireWire (IEEE 1394). When is also responsible for managing communications with the other expansion buses, such as PCI, USB, and legacy buses.



A typical motherboard chipset

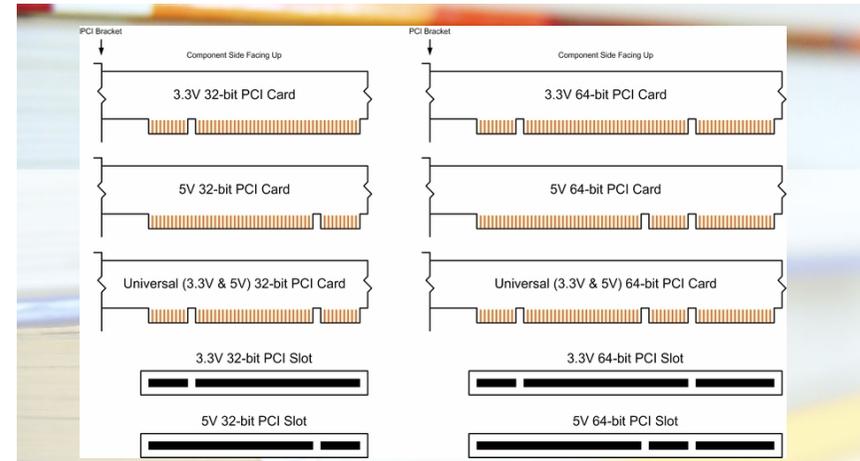
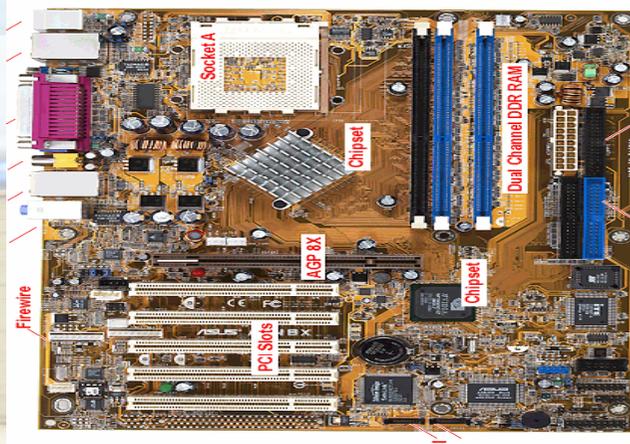


Expansion slots

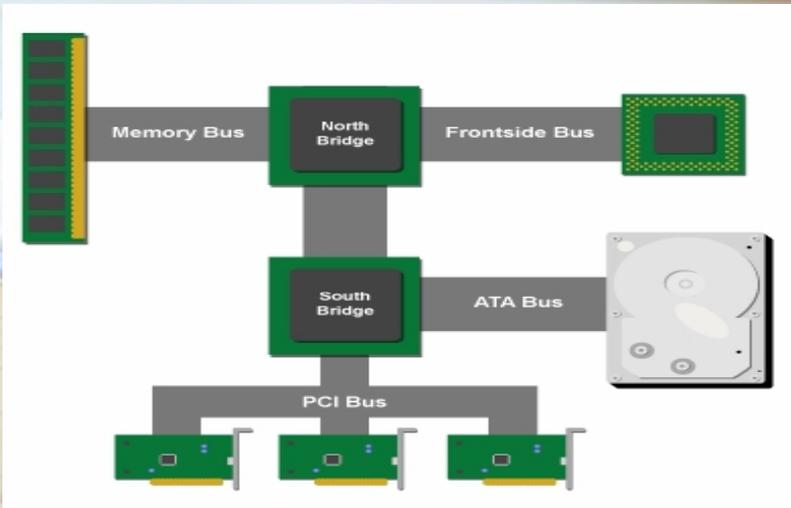
- used to install various devices in the computer to expand its capabilities.
- **The main types of expansion slots used in computers today:**
 - PCI
 - AGP
 - PCIe
 - AMR
 - CNR



Peripheral Component Interconnect Bus (PCI).

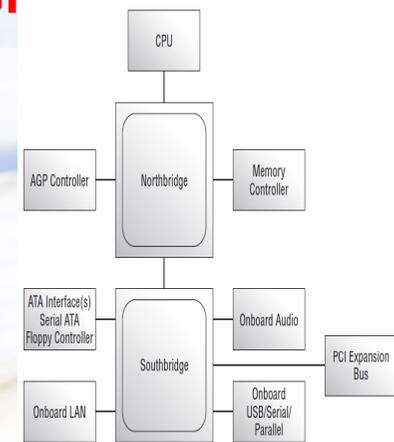


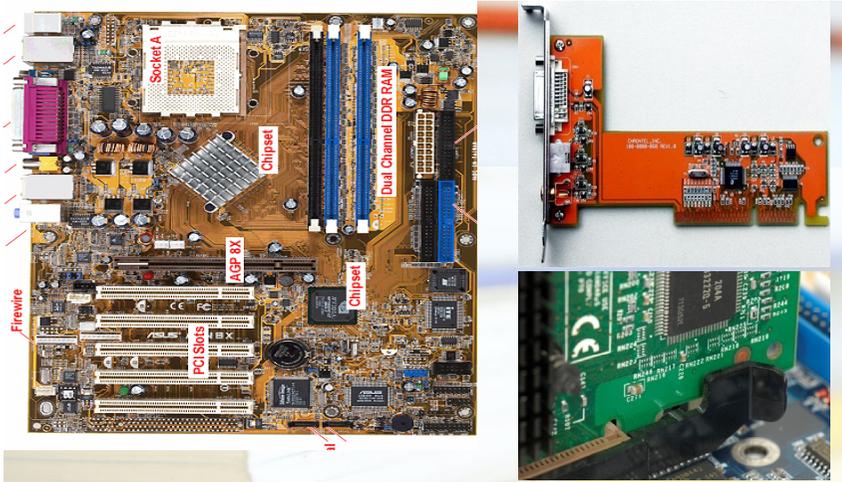
Bus Type	Bus Width (Bits)	Bus Speed (MHz)	Bits per line per	Bandwidth (MBps)
PCI	32	33	1	133
PCI 66 MHz	32	66	1	266
PCI 64-bit	64	33	1	266
PCI 66 MHz/64-bit	64	66	1	533



Accelerated Graphics Port (AGP)

- reserved for use with **video adapters**; no other expansion cards use AGP.
- AGP is a local bus that can pump out video images as much as **eight times faster** than PCI can.
- The port itself provides a direct connection between the video adapter and the system's memory using





Bus Type	Bus Width (Bits)	Bus Speed (MHz)	Bits per line per cycle	Bandwidth (MBps)
AGP	32	66	1	266
AGP 2x	32	66	2	533
AGP 4x	32	66	4	1066
AGP 8x	32	66	8	2133

PCIe Expansion Slots

PCI-Express x4

PCI-Express x16

PCI-Express x1

PCI-Express x16

Normal PCI



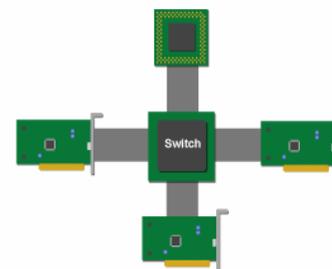
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intro

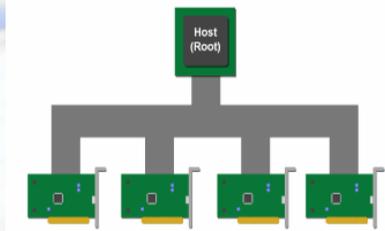
- Introduced by Intel in 2004 designed to replace the older PCI, PCI-X, and AGP standards.
- **features of PCI Express**
- Its is a topology based on point-to-point serial links, rather than a shared parallel bus architecture
- PCIe is the current choice of gaming aficionados.

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1-Point-to-Point Serial links VS a Shared Parallel Bus Architecture

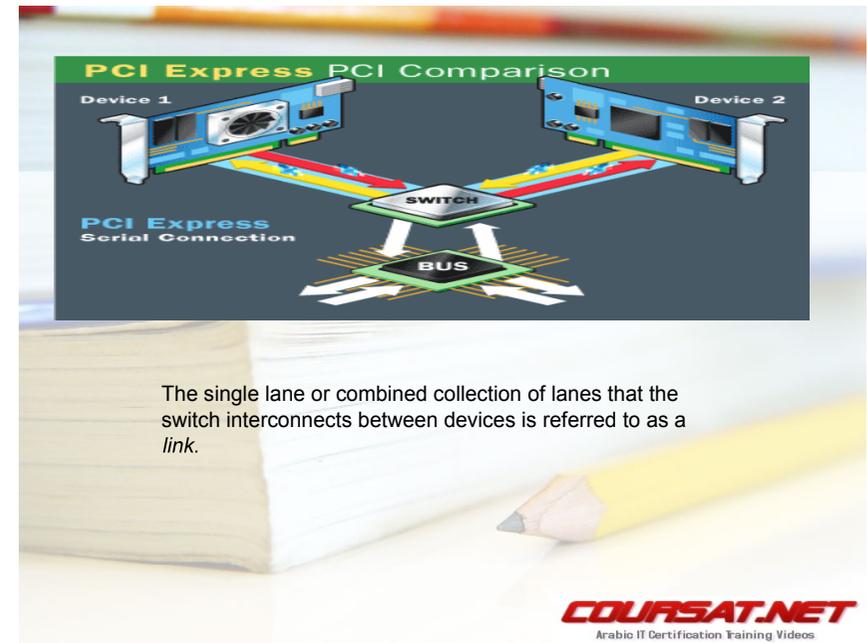
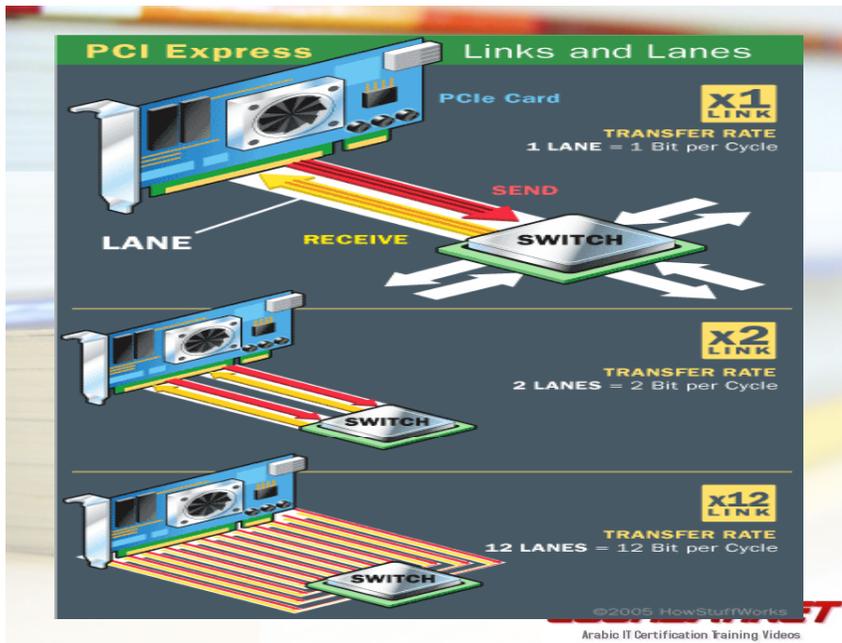


shared switch



the shared bus

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2-PCIe is a Serial Technology

<p><u>Serial Communication</u></p> <p>is the process of sending data one bit at one time, sequentially, over a communication channel or computer bus</p>	<p><u>Parallel communication</u></p> <p>where several bits are sent together, on a link with several parallel channels.</p>
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But Now serial is faster than Parallel

- synchronization difficulties
- keeping the bits aligned in a parallel channel requires more complex electronics.
- Serial Is Less Costly
- It is less costly to design ever faster serial lines than to create and build the necessary circuitry to keep faster parallel channels properly aligned.

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PCIe is the current choice of gaming aficionados

- It has the capability of being faster than AGP while maintaining the flexibility of PCI.

Bus Type	Bus Width (Bits)	Bus Speed (MHz)	Bits per line per cycle	Bandwidth (MBps)
PCI-Express 1.0	1	2500	0.8	250
PCI-Express 1.0	16	2500	0.8	4000
PCI-Express 1.0	32	2500	0.8	8000
AGP	32	66	1	266
AGP 2x	32	66	2	533
AGP 4x	32	66	4	1066
AGP 8x	32	66	8	2133

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NVIDIA's Scalable Link Interface (SLI)

- Allow such users to combine **preferably identical** graphics adapters in neighboring **PCIe x16** slots with a **hardware bridge** to form a single virtual graphics adapter.
- The job of the bridge is to provide **non chipset communication** among the adapters.
- The bridge is **not a requirement** for SLI to work, but **performance suffers** without it.
- SLI-ready motherboards allow **two, three, or four** PCIe graphics adapters to pool their graphics processing units (GPUs) and memory to feed graphics output to a single monitor attached to the adapter acting as SLI master.
- SLI implementation results in increased **graphics performance** over single-PCIe and non-PCIe

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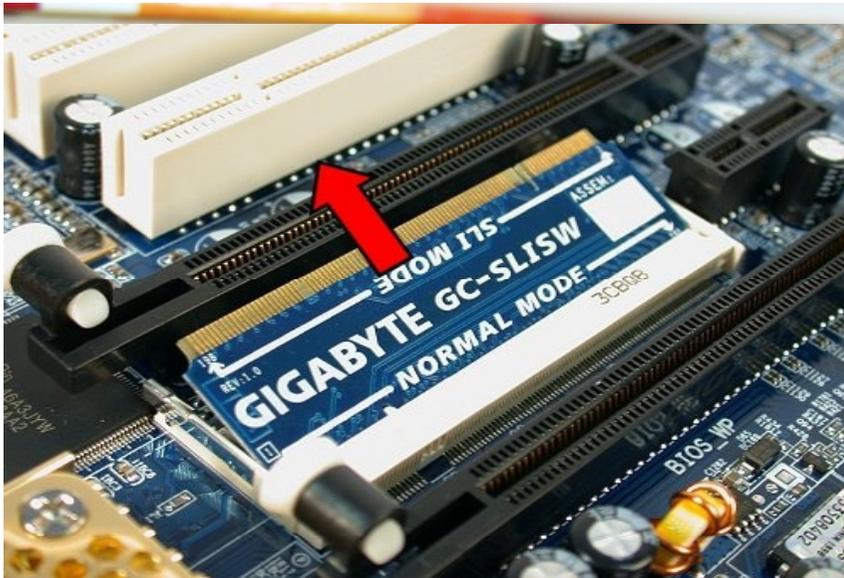
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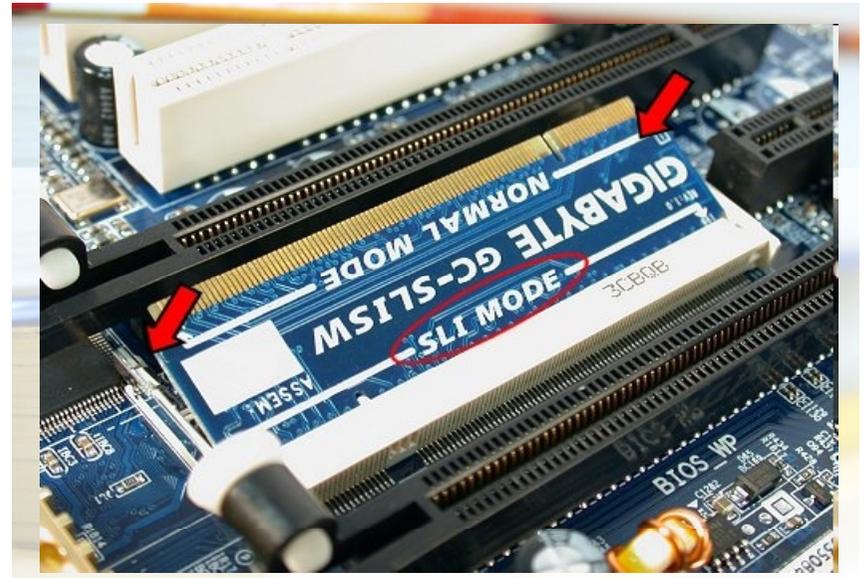
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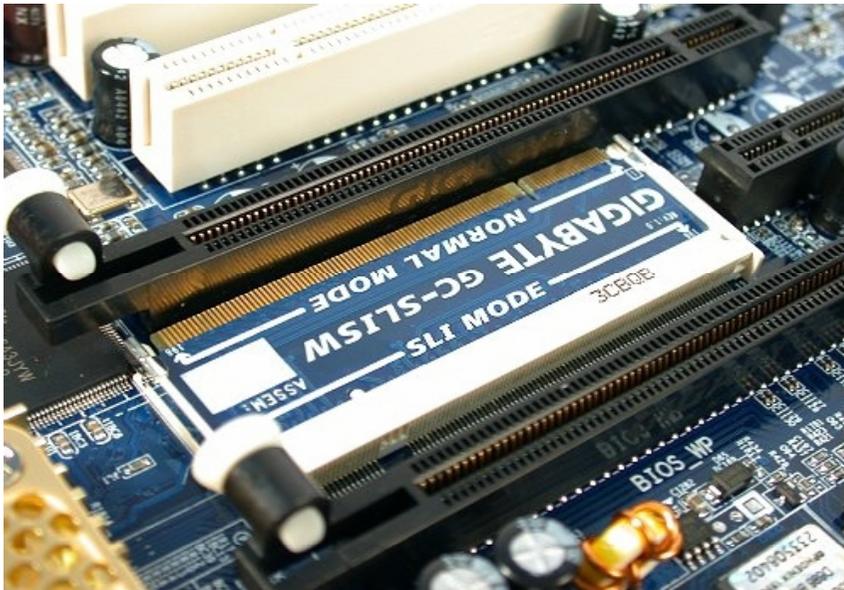
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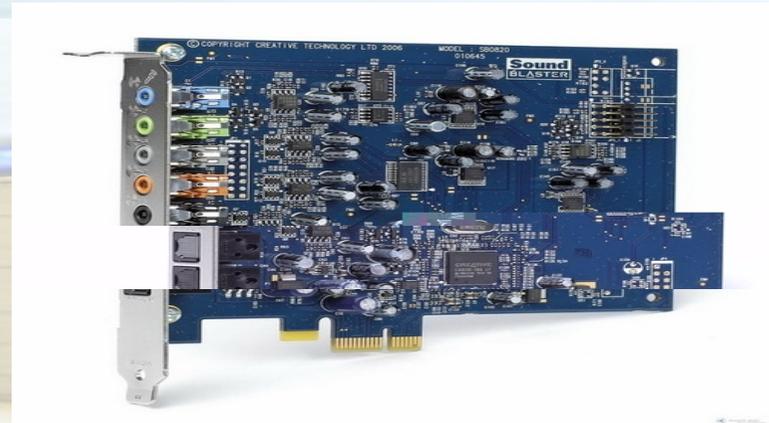
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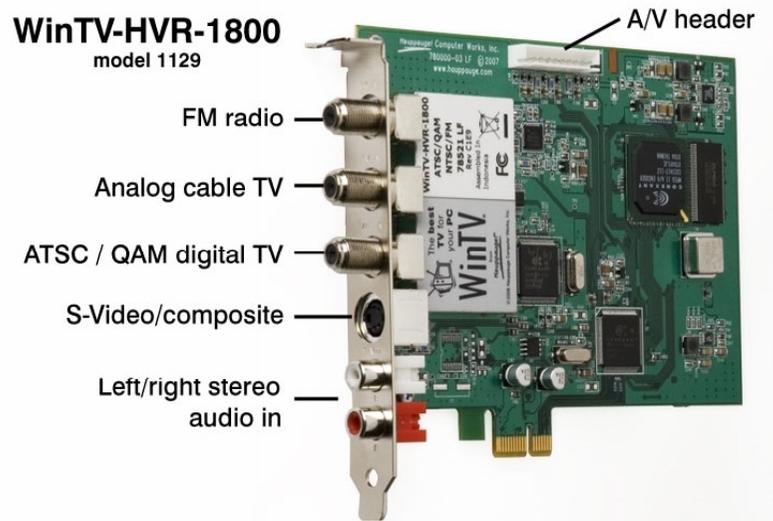
X-FI XTREME - PCI EXPRESS X-FI EXTREME AUDIO



Belkin FireWire 800 and USB 2.0 PCI ExpressCard



WinTV-HVR-1800 model 1129



AMR Expansion Slots

Audio Modem Riser

- It was designed by [Intel](#) to interface with chipsets and provide analog functionality at minimal cost
- The small board is called a *riser* because it rises above the motherboard rather than laying flatly on it. Having this circuitry on a riser means that it doesn't have to be part of the motherboard itself.
- Because getting certification from the FCC(**Federal Communications Commission**) for the manufacture of a new motherboard design is a lengthy process, removing this function from the motherboard provides more flexibility for manufacturers and allows advances in audio modem design to be implemented more easily.
- Physically, it has two rows of **23 pins, making 46 pins total**
- **but OEM system builders ignored it in droves. Why?**
 - Mainly because the AMR slot took the place of a standard PCI slot, and most motherboard designers and system builders rightly preferred having an extra PCI slot to having an AMR slot of dubious utility.
 - The AMR slot also had limited functionality

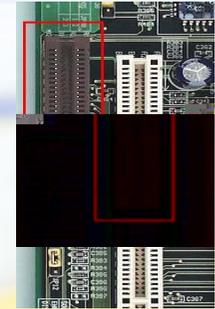


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CNR Expansion Slots

Communications and Networking Riser

- Physically, it has two rows of 30 pins, making 60 pins total
- **Advantages**
- include networking
- support, Plug and Play compatibility
- support for hardware acceleration (as opposed to CPU control only),
- no need to lose a competing PCI slot unless the CNR slot is in



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