

# Bus technology



BUS Each computer or CPU has some kind of channel that allows devices inside computer to communicate with each other. This channel connects processor and RAM. A computer or CPU needs to be able to send various data values, instructions, and information to all the devices and components inside your computer as well as the different peripherals and devices attached. At the bottom of a motherboard there are a whole network of lines or electronic pathways that join the different components together.

These electronic pathways are nothing more than tiny wires that carry information, data and different signals throughout the computer between the different components. This network of wires or electronic pathways is called the BUS. In other words, BUS is a set of electronic signal pathways that allows information and signals to travel between components inside or outside of a computer. The evolution of PC bus systems over a period of more than a decade has given rise to a profusion of terminology, much of it confusing, redundant or obsolete. The system bus is often referred to as the " main bus", " processor bus" or " local bus".

Alternative generic terminology for an I/O bus includes " expansion bus", " external bus", " host bus" as well as, rather confusingly, " local bus". A given system can use a number of different I/O bus systems and a typical arrangement is for the following to be implemented concurrently:

- an ISA Bus, the oldest, slowest and soon to become obsolete I/O Bus system
- a PCI Bus, present on Pentium-class systems since the mid-1990s
- a USB Bus, the replacement for the PC's serial port which allows up to 127 devices to connected using either a hub device or by daisy-chaining.

A computer's bus can be divided into two different types, Internal and External. The Internal bus connects the different components inside the case: The CPU, system memory, and all other components on the motherboard.

It's also referred to as the System Bus. The External bus connects the different external devices, peripherals, expansion slots, I/O ports and drive connections to the rest of the computer. In other words, the External bus allows various devices to be added to the computer. It allows for the expansion of the computer's capabilities. It is generally slower than the system bus.

Another name for the External bus, is the Expansion bus. What kind of stuff travels on the bus? For instant, stuff that travels on the bus generally we called data. Data has to be exchanged between devices. Some of the electronic pathways or wires of the Internal bus or the External bus are dedicated to moving data.

These dedicated pathways are called the Data Bus. Data is stored, manipulated and processed in system memory. System memory is like a vast sea of information full of fish (data). Your computer has to move information in and out of memory, and it has to keep track of which data is stored where.

The computer knows where all the fishes are, but it has to transmit that information to the CPU and other devices. It has to keep a map of the different address locations in memory, and it has to be able to transmit and describe those memory locations to the other components so that they can

access the data stored there. The info used to describe the memory locations travels along the address bus. The size, or width of the address bus directly corresponds to the number of address locations that can be accessed. This simply means that the more memory address locations that a processor can address, the more RAM it has the capability of using.

It makes sense, right? A 286 with a 16 bit address bus can access over 16 million locations, or 16 Mb of RAM.

A 386 CPU with a 32 bit address bus can access up to 4 GB of RAM. Of course, at the present time, due to space and cost limitations associated with the average home computer, 4GB of RAM is not practical. But, the address bus could handle it if it wanted to! Another name for the address bus is the memory bus. Expansion Slot (connector) Remember that the expansion bus, or external bus, is made up of the electronic pathways that connect the different external devices to the rest of your computer.

These external devices (monitor, telephone line, printer, etc.

) connect to ports on the back of the computer. Those ports are actually part of a small circuit board or ' card' that fits into a connector on your motherboard inside the case. The connector is called an expansion slot.

Note: Communication ports (com ports), printer ports, hard drive and floppy connectors, etc.

, are all devices which used to be installed via adapter cards. These connectors are now integrated onto the motherboard, but they are still

accessed via the expansion (external) bus and are allocated the same type of resources as required by expansion cards.

As a matter of fact (and unfortunately, in my opinion), other devices like modems, video technology, network and sound cards are now being integrated, or embedded, right onto the motherboard. Expansion slots are easy to recognize on the motherboard.

They make up a row of long plastic connectors at the back of your computer with tiny copper 'finger slots' in a narrow channel that grab the metal fingers or connectors on the expansion cards. In other words, the expansion cards plug into them. The slots attach to tiny copper pathways on the motherboard (the expansion bus), which allows the device to communicate with the rest of the computer.

Each pathway has a specific function.

Some may provide voltages needed by the new device (+5, +12 and ground), and some will transmit data. Other pathways allow the device to be addressed through a set of I/O (input/output) addresses, so that the rest of the computer knows where to send and retrieve information. Still more pathways are needed to provide clock signals for synchronization and other functions like interrupt requests, DMA channels and bus mastering capability. As with any other part of the computer, technology has evolved in an effort to increase the speed, capability and performance of expansion slots.

Now you'll hear about more busses - PCI bus, ISA bus, VESA bus, etc.

Not to worry! These are all just types of expansion (external) busses. They just describe the type of connector and the particular technology or architecture being used. Thus, the adapter card being installed must match the architecture or type of slot that it's going into. An ISA card fits into an ISA slot, a PCI adapter card must be installed into a PCI expansion slot, etc.

More on this later. IRQs (Interrupt Request lines) Interrupt Request lines are special pathways directly to the processor that a device uses to get the attention of the CPU when it needs to.