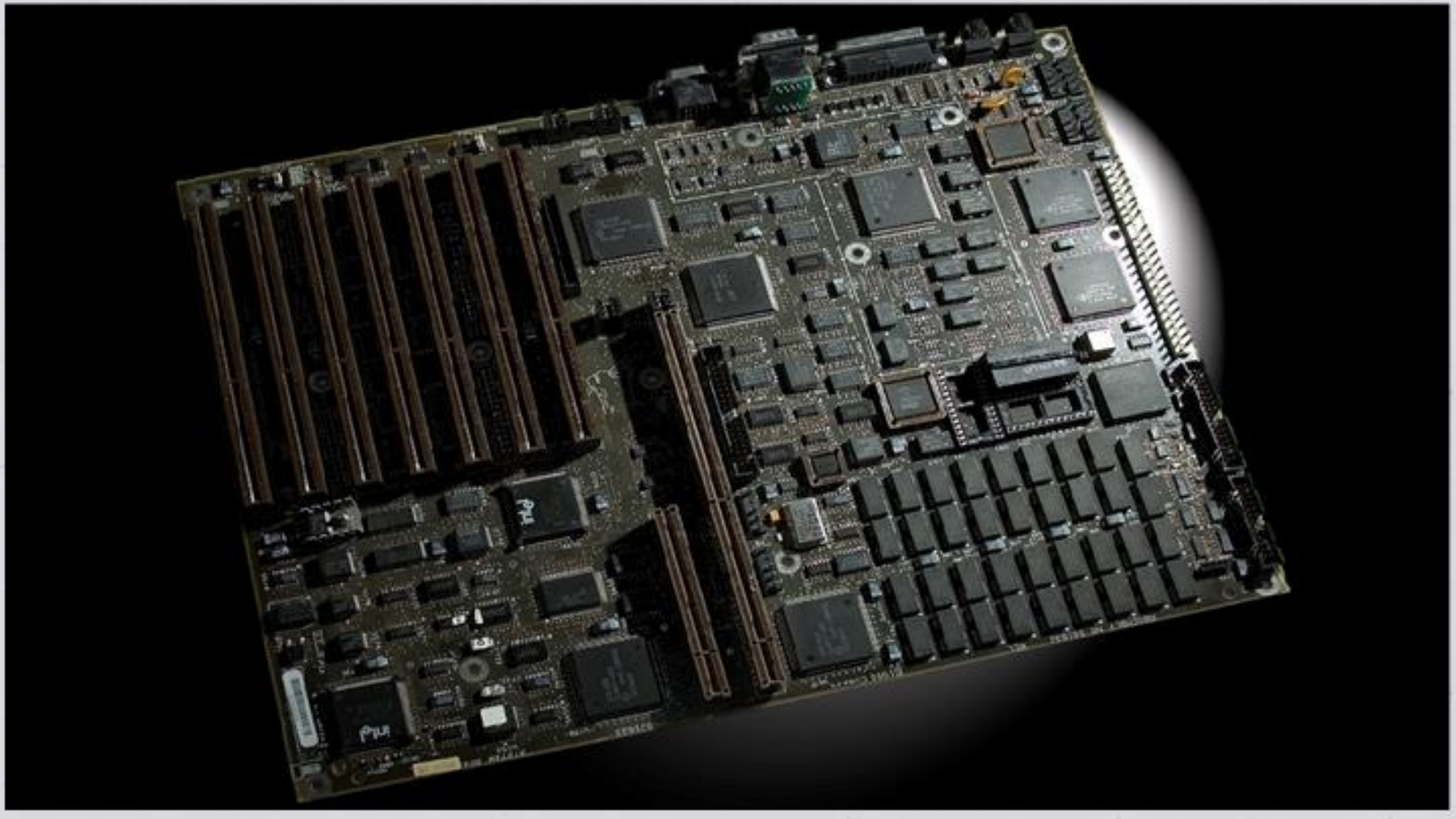
Chapter 2: Computer Hardware : Motherboard



Chapter 2: Computer Hardware : Motherboard

- **In this chapter, you will learn to**

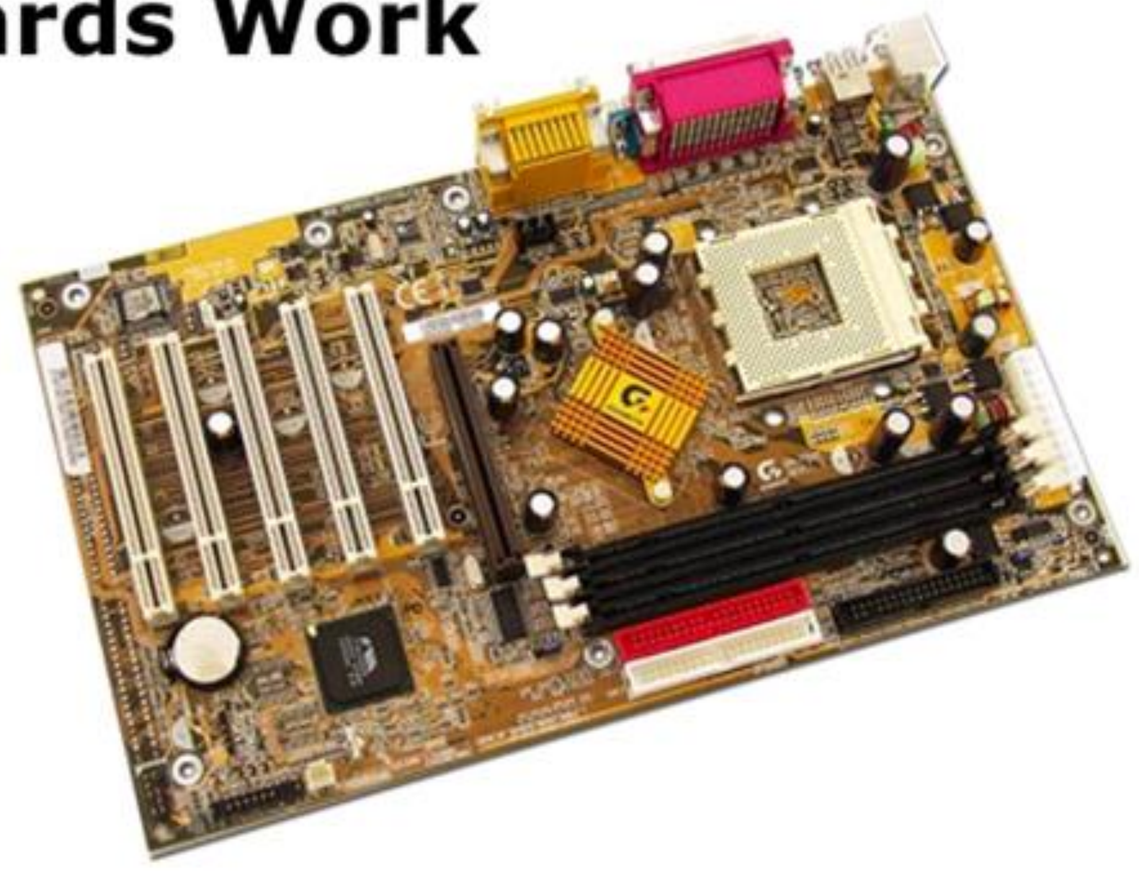
  -Explain how motherboards work

  -Identify the types of motherboards

  -Explain chipset varieties

Chapter 2: Computer Hardware : Motherboard

How Motherboards Work



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Characteristics

- **Form factor defines**
  - Size of the motherboard
  - General location of components and parts

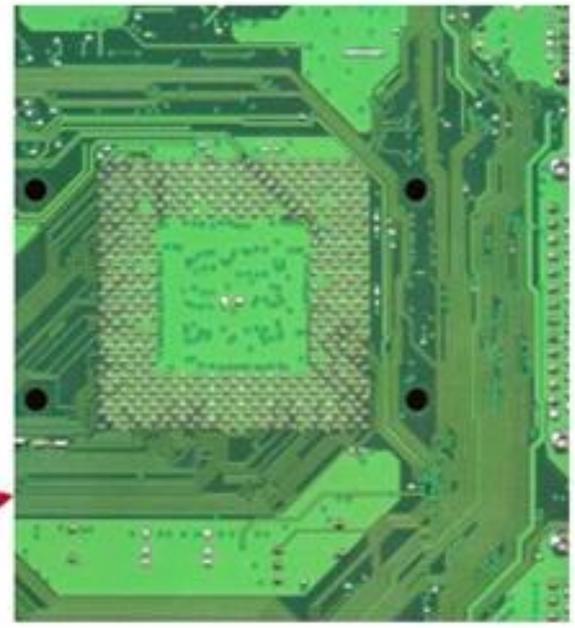
- **Chipset defines**
  - Type of processor and RAM supported

- **Built-in components**
  - With a built-in NIC, extra NIC not needed

Chapter 2: Computer Hardware : Motherboard

Layers of PCB

- **Motherboards are officially printed circuit boards (PCBs)**
  - PCBs come in multiple layers with highways of wires (bus systems) in the layers
  - These highways of wires are called traces



- **Boards are standardized so that they can fit in cases**

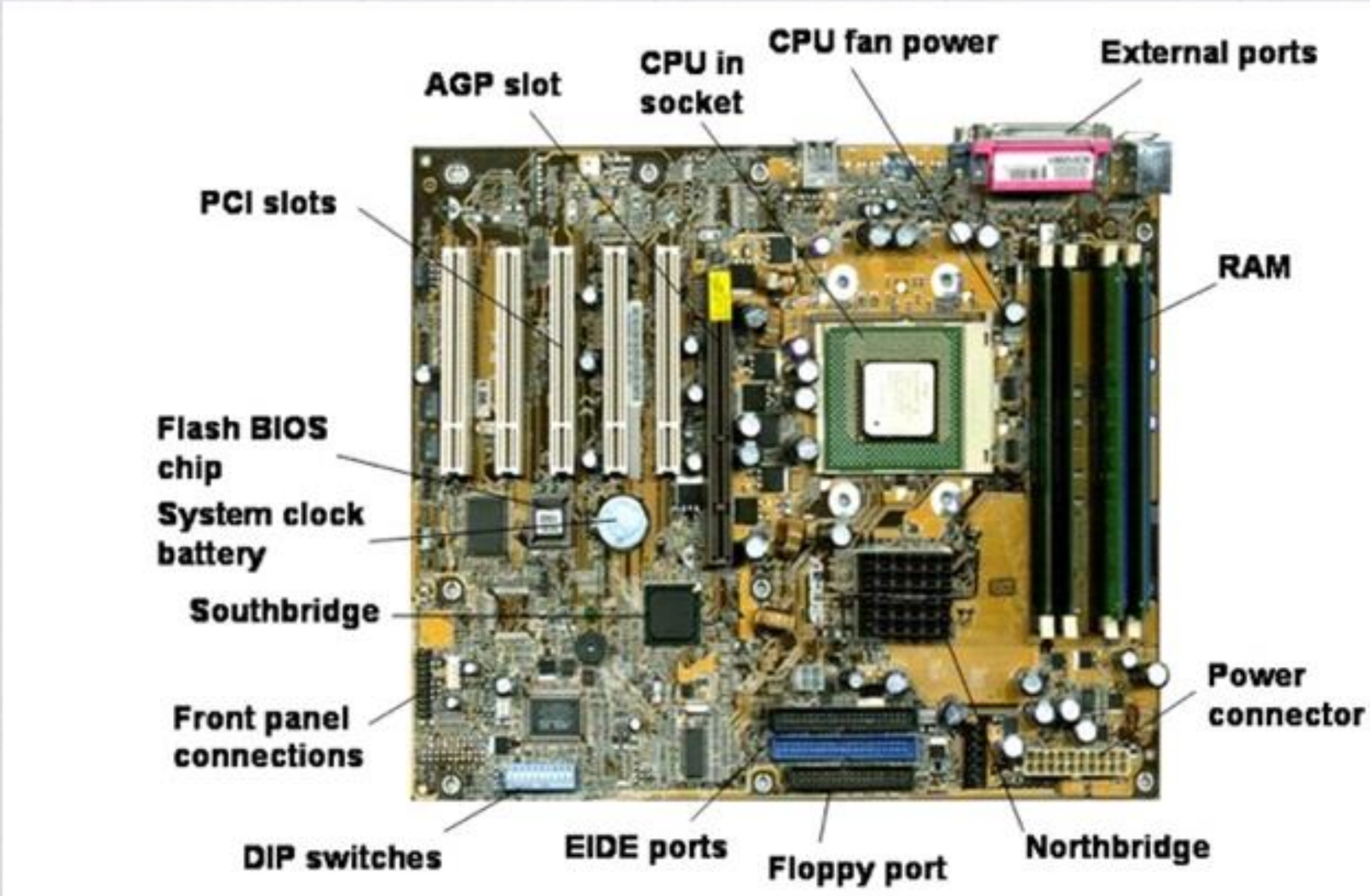
Chapter 2: Computer Hardware : Motherboard

The AT Form Factor

- **IBM invented the AT form factor in the early '80s**
  - Lasted through mid '90s
  - Currently obsolete
  - Large keyboard socket, split power socket (P8/P9)
  - Baby AT was smaller version
- **Alternatives were**
  - LPX
  - NLX

Chapter 2: Computer Hardware : Motherboard

ATX Motherboard Parts



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ATX Form Factor

- **Created in 1995**
  - About same size as Baby AT
  - Had many ports accessible from rear of PC including mini-DIN
  - RAM was closer to Northbridge and CPU for better performance
  - Uses the soft power feature to turn PC on and off through software

Chapter 2: Computer Hardware : Motherboard

ATX Spin Offs

- **MicroATX and FlexATX two smaller versions of ATX**
  - Many techs and Web sites use the term mini-ATX to describe these boards
  - Cases need to be matched to motherboards
  - Can't put a larger motherboard into a smaller case
  - Case manufacturers have made accommodations for smaller motherboards in larger cases

Chapter 2: Computer Hardware : Motherboard

ATX Spin Offs

- **BTX (Balanced Technology Extended)**
  - Due to heat, cooler form factors needed

- **Three subtypes of BTX**
  - BTX designed to replace ATX
  - microBTX designed to replace microATX
  - picoBTX designed to replace FlexATX

- **Proprietary form factors**
  - Unique to a specific company
  - Don't follow standards and drive purchase to that company
  - Difficult to support

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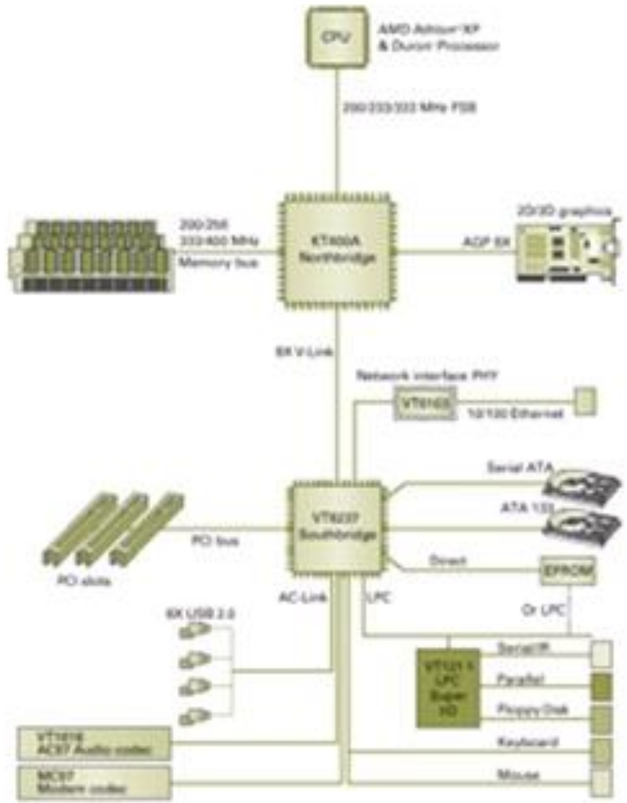
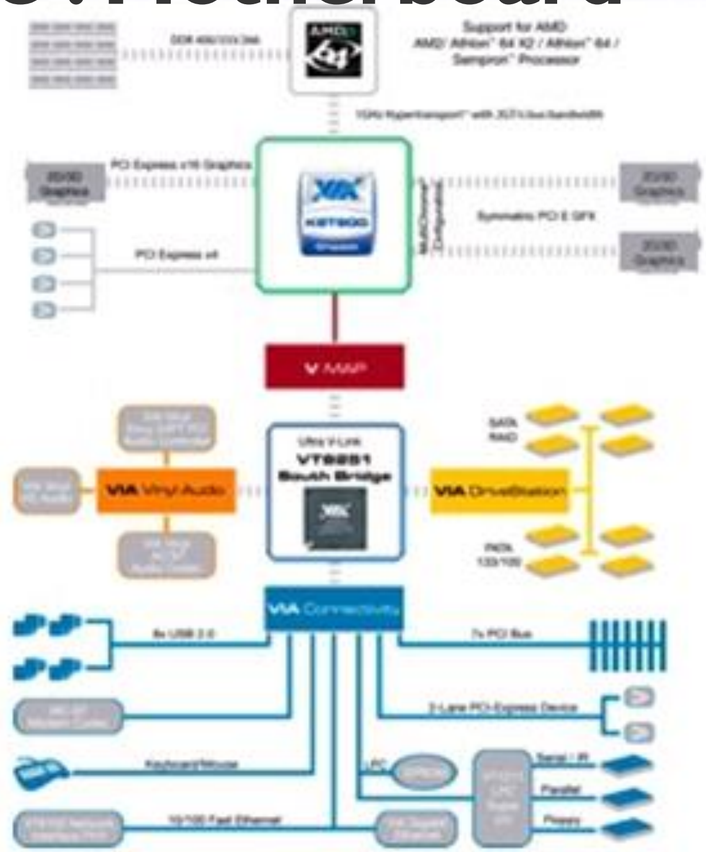
Chipsets





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Chipsets

- **A chipset defines**
  - The processor type
  - Type and capacity of RAM
  - What internal and external devices the motherboard will support
  - Serves as an electronic interface among the CPU, RAM, and I/O devices

- **Most modern chipsets have two primary chips**
  - Northbridge
  - Southbridge

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Chipsets Chips

- **Northbridge**
  - Helps the CPU work with RAM (on Intel-based systems)
  - Communicates with video on newer AMD systems
- **Southbridge**
  - Handles expansion devices and mass storage drives
  - Sits between expansion slots and EIDE and FDD controllers
  - Also called the I/O Controller Hub (ICH5) or peripheral bus controller
- **Super I/O chip**
  - Provides legacy support

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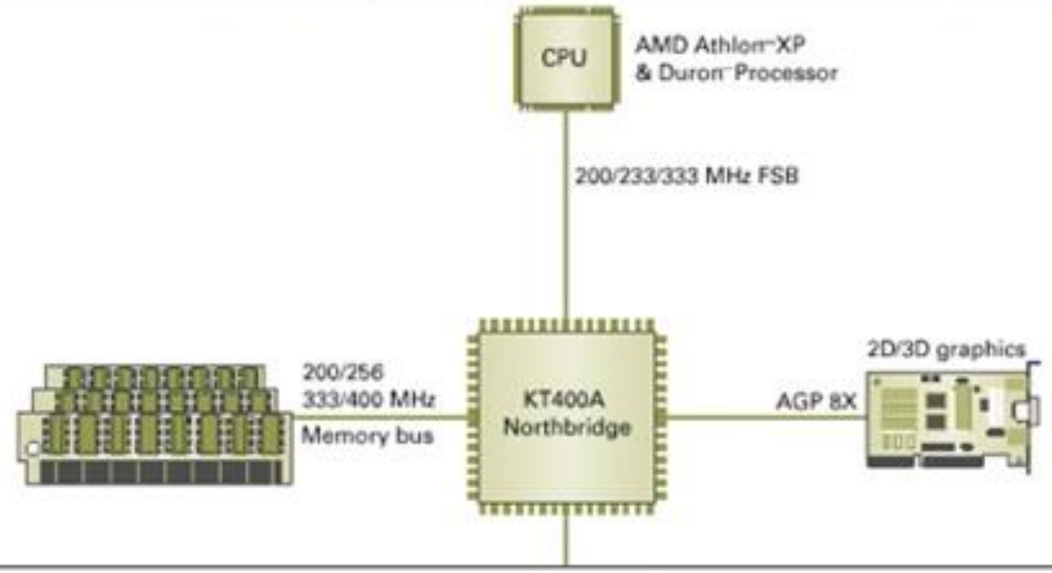
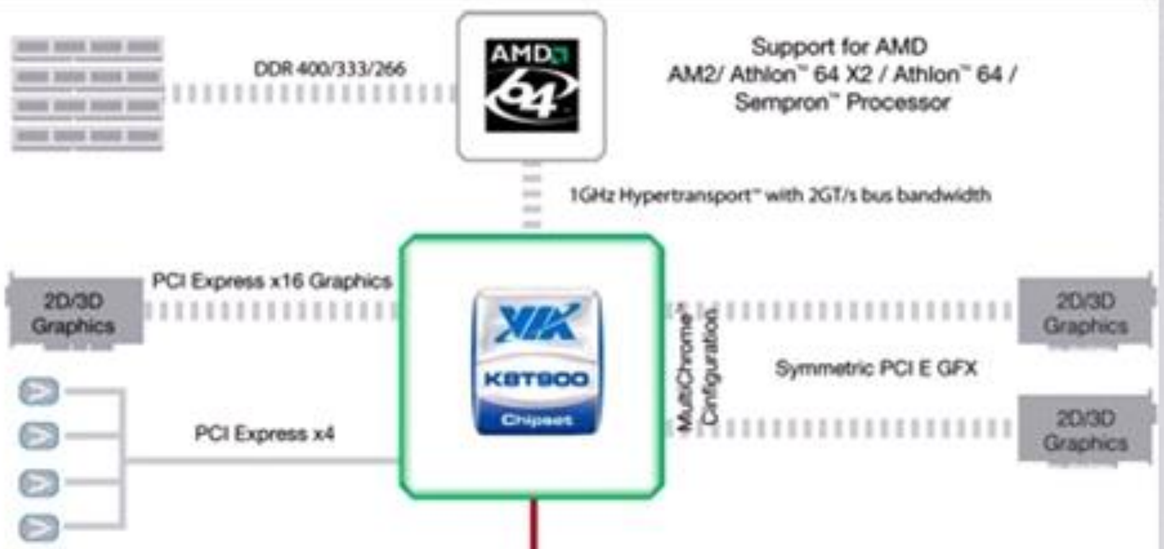
Northbridge

- **Older Northbridge functions**
  - Worked similar on Intel



- **Newer Northbridge functions**
  - Only AMD



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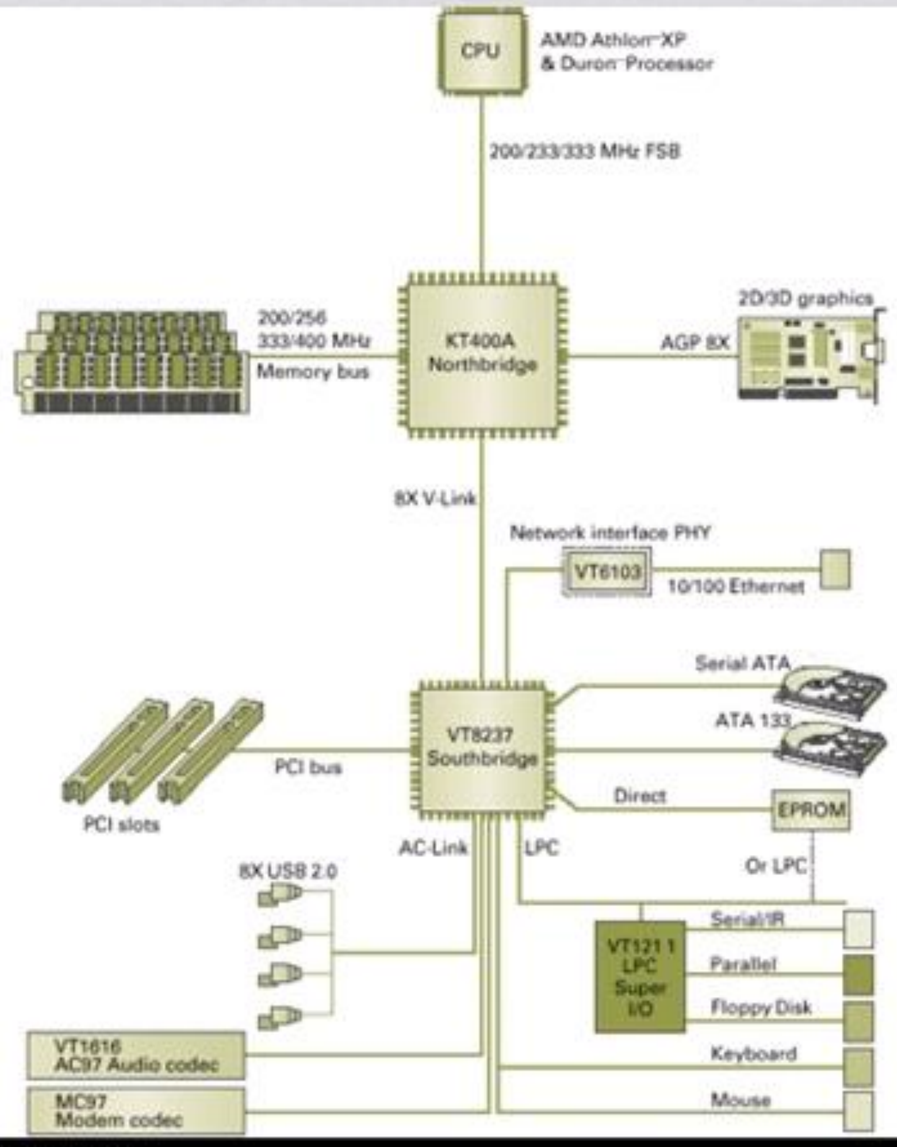
Chipset Schematic

- **Schematic of an older chipset**



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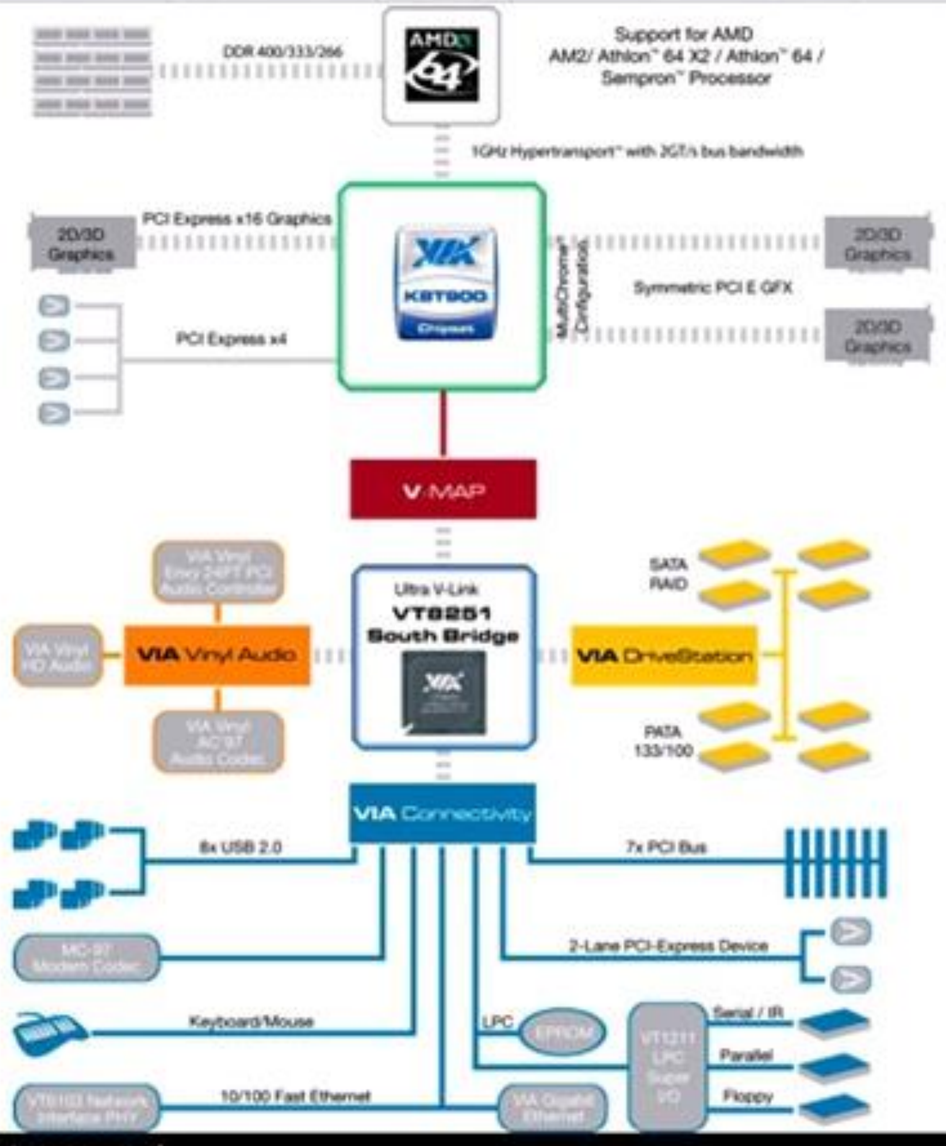
Chipset Schematic

- **Schematic of an modern chipset**



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Chipset Chips

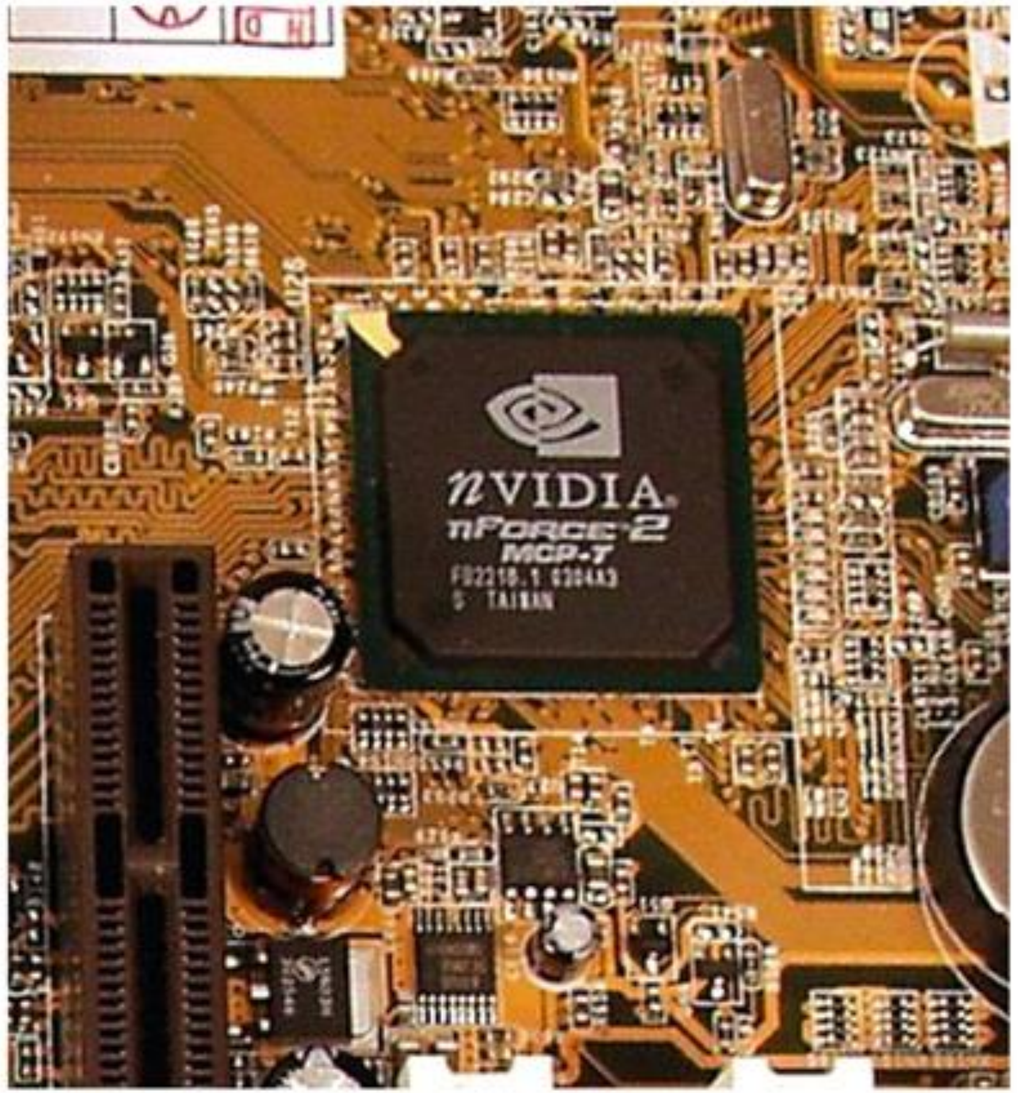
- **Not always called Northbridge and Southbridge**

- **Intel-based motherboards may refer to them as**
  - Memory controller hub (MCH) for Northbridge
  - I/O controller hub (ICH) for Southbridge

Chapter 2: Computer Hardware : Motherboard

Many Makers of PC Chipsets

- Intel
- VIA
- AMD
- SiS
- Ali
- NVIDIA



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Motherboard Components

- **Not all chipset features may be supported with ports (for cost savings)**
- **Some motherboards may add features**
  - USB / FireWire
  - Sound
  - RAID
  - AMR/CNR

Chapter 2: Computer Hardware : Motherboard

Common Problems

- **Catastrophic failure**
  - System will not boot
  - Although uncommon, most motherboards will fail (if they're going to) within the first 30 days due to manufacturing defects, called burn-in failure
  - Electrostatic discharge is the other most common cause
  - To fix, replace the motherboard

Chapter 2: Computer Hardware : Motherboard

Common Problems

- **Component failure**
  - Intermittent problems
  - Examples include a hard drive that shows up in CMOS but not in Windows
  - Most common causes are electrical surges and ESD
  - Sometimes a BIOS upgrade may solve this problem if the issue is lack of BIOS support for a newer technology
  - Fixes include replacing the component with an add-on card or flashing the BIOS

Chapter 2: Computer Hardware : Motherboard

Common Problems

- **Ethereal symptoms**
  - Things just don't work all the time
  - PC reboots itself for no apparent reason
  - Blue Screens of Death
  - Causes include faulty components, buggy device drivers or application software, slight corruption of the operating system, and power supply problems
  - Fixes include flashing the BIOS or replacing the motherboard

Chapter 2: Computer Hardware : Motherboard

Troubleshooting Techniques

- **Isolate the problem by eliminating potential factors**
  - If the hard drive doesn't work, try a different hard drive or try the same hard drive with a different motherboard
    - If the new hard drive works, you know it wasn't the motherboard
    - If the same hard drive with a different motherboard works, you can suspect the motherboard

Chapter 2: Computer Hardware : Motherboard

Beyond A+

- **Relatively new in PC technology**
  - Shuttle's new form factor results in PCs the size of a toaster but as powerful as larger PCs
  - VIA's two tiny form factors called ITX and Mini-ITX