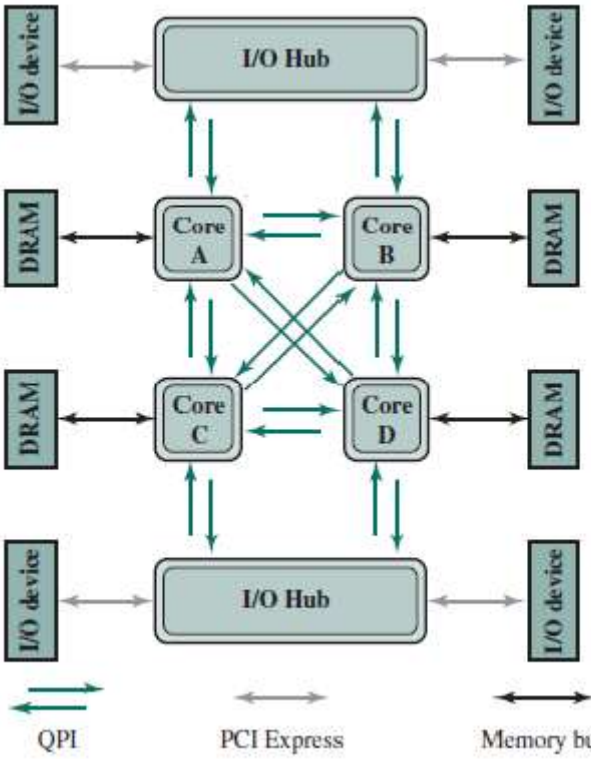
POINT TO POINT INTERCONNECTION STRUCTURE WITH PACKETIZED DATA TRANSFER

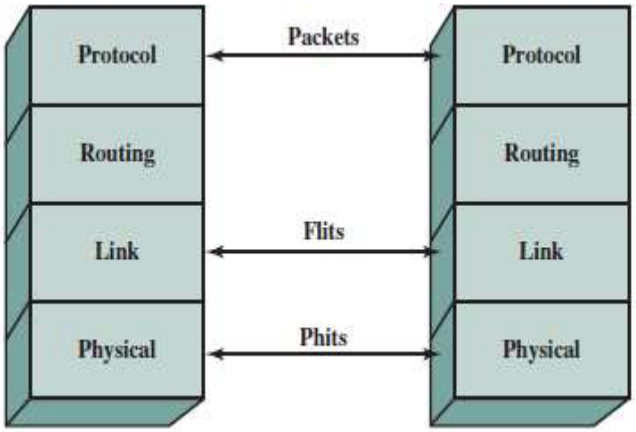
Compared to the shared bus, the point-to-point interconnect has lower latency, higher data rate, and better scalability.
As an example of the Point-to-Point interconnect approach we would discuss **QuickPath Interconnect (QPI)**, which was introduced by Intel in 2008.



The following are significant characteristics of QPI and other point-to-point interconnect schemes:

1) Multiple direct connections: Multiple components within the system have direct connections to other components. This eliminates the need for arbitration.

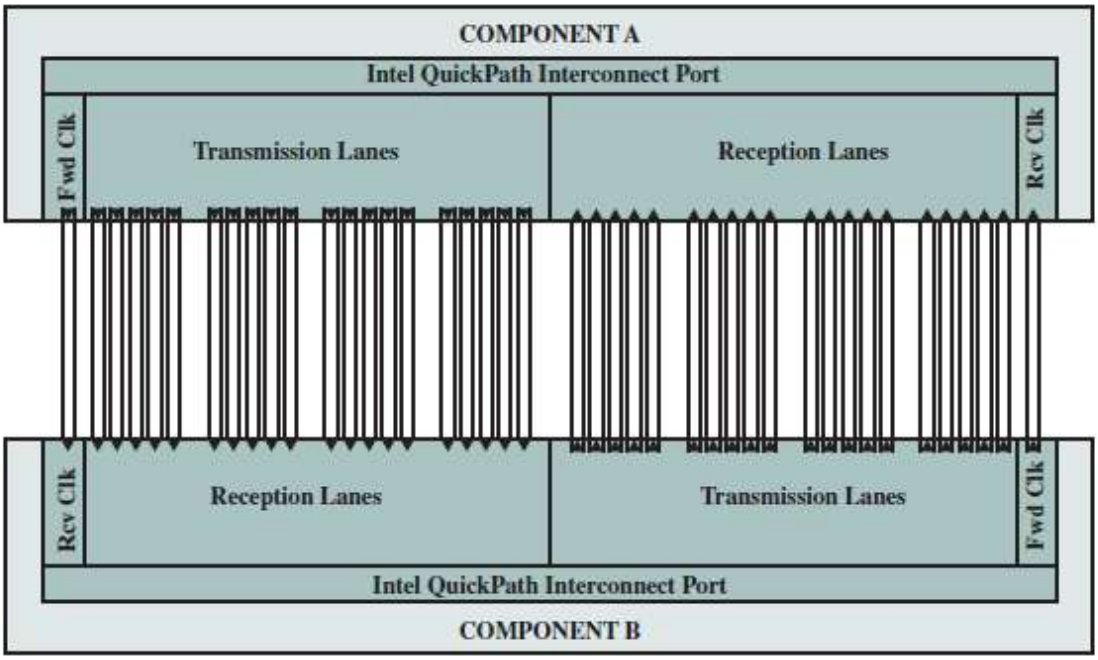
2) Layered Protocol Architecture: As found in network environments, these interconnects use a layered protocol architecture, rather than the simple use of control signals.
QPI is a four-layer protocol architecture, encompassing the following
Layer:



Protocol: The high-level set of rules for exchanging packets of data between devices. A packet is comprised of an integral number of Flits.

Routing: Provides the framework for directing packets through the fabric. Routing tables are defined by firmware

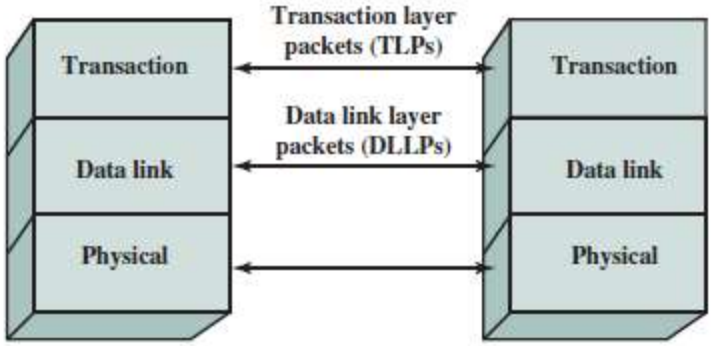
Link: Responsible for reliable transmission and flow control. The Link layer's unit of transfer is an 80-bit Flit (flow control unit).
Each flit consists of a 72-bit message payload and an 8-bit error control code called a cyclic redundancy check (CRC)

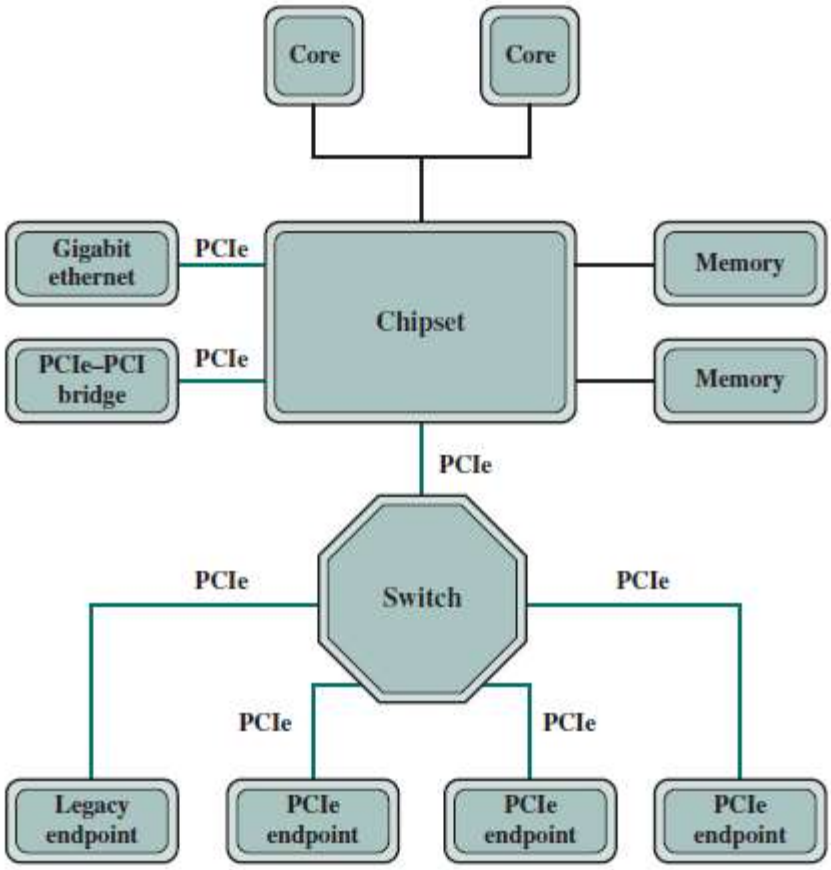


Physical: Consists of the actual wires carrying the signals, The unit of transfer at the Physical layer is 20 bits, which is called a Phit (physical unit).

3) Packetized Data Transfer: Data are not sent as a raw bit stream. Rather, data are sent as a sequence of packets, each of which includes control headers and error control codes. A typical data packet payload is a block of data being sent to or from a cache.

Peripheral Component Interconnect Express (PCIe)




Core
Core
Gigabit ethernet
PCIe
Chipset
Memory
PCIe–PCI bridge
PCIe
Memory
PCIe
Switch
PCIe
PCIe
PCIe
PCIe
Legacy endpoint
PCIe endpoint
PCIe endpoint
PCIe endpoint