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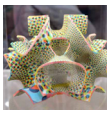
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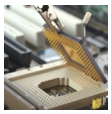
Puzzle: Central Processing Unit

What is a packet?

Packet - E-mail Example

Header	Sender's IP address Receiver's IP address Protocol Packet number	96 bits
Payload	Data	896 bits
Trailer	Data to show end of packet Error correction	32 bits

I've heard that data travels in packets on a computer network. What is a packet, and why do networks use them?
2009 HowStuffWorks

Network Packet Structure

Most network packets are split into three parts:

Header - The header contains instructions about the data carried by the packet. These instructions may include:

- Length of packet (some networks have fixed-length packets, while others rely on the header to contain this information)
- Synchronization (a few bits that help the packet match up to the network)
- Packet number (which packet this is in a sequence of packets)
- Protocol (on networks that carry multiple types of information, the protocol defines what type of packet is being transmitted: e-mail, Web page, streaming video)
- Destination address (where the packet is going)
- Originating address (where the packet came from)

Payload - Also called the **body** or **data** of a packet. This is the actual data that the packet is delivering to the destination. If a packet is fixed-length, then the payload may be **padded** with blank information to make it the right size.

Trailer - The trailer, sometimes called the **footer**, typically contains a couple of bits that tell the receiving device that it has reached the end of the packet. It may also have some type of error checking. The most common error checking used in packets is **Cyclic Redundancy Check (CRC)**. CRC is pretty neat. Here is how it works in certain computer networks: It takes the sum of all the 1s in the payload and adds them together. The result is stored as a hexadecimal value in the trailer. The receiving device adds up the 1s in the payload and compares the result to the value stored in the trailer. If the values match, the packet is good. But if the values do not match, the receiving device sends a request to the originating device to resend the packet.

As an example, let's look at how an e-mail message might get broken into packets. Let's say that you send an e-mail to a friend. The e-mail is about 3,500 bits (3.5 kilobits) in size. The network you send it over uses fixed-length packets of 1,024 bits (1 kilobit). The header of each packet is 96 bits long and the trailer is 32 bits long, leaving 896 bits for the payload. To break the 3,500 bits of message into packets, you will need four packets (divide 3,500 by 896). Three packets will contain 896 bits of payload and the fourth will have 812 bits. Here is what one of the four packets would contain:

Each packet's header will contain the proper protocols, the originating address (the IP address of your computer), the destination address (the IP address of the computer where you are sending the e-mail) and the packet number (1, 2, 3 or 4 since there are 4 packets). Routers in the network will look at the destination address in the header and compare it to their lookup table to find out where to send the packet. Once the packet arrives at its destination, your friend's computer will strip the header and trailer off each packet and reassemble the e-mail based on the numbered sequence of the packets.

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